The Builder.

VOL. XC.—No. 3302. MAY 19, 1906.

ILLUSTRATIONS.

New Offices for the Alliance Assurance Company ..... { Mr. R. Norman Shaw, R.A., and Mr. Ernest Newton, Joint Architects.

Busbridge Hall, Godalming ..... Messrs. Ernest George & Yeates, Architects.

Royal Exchange Buildings, City Offices, Catherine-street ..... Messrs. Ernest George & Yeates, Architects.

Offices, Covent Garden, as Originally Proposed ..... Mr. H. H. Statham, F.R.I.B.A., Architect.

Illustrations in Text.

Alliance Assurance Offices, St. James's-street. Plans ..... Page 557

Royal Exchange Buildings. Plan ..... Page 558

Illustrations to Student's Column ..... Page 559

CONTENTS.

	PAGE
The Paris Salons	543
Liabilities of Trade Unions	545
Notes	545
At the Château de Bagatelle	548
Magazines and Reviews	548
The Royal Institute of British Architects	549
The Surveyors' Institution	550
Home Arts and Industries Association Exhibition	553
Prehistoric Life on the Downs	553
The History of Symmetry in Art	554
The Society of Arts	554
The London Tribunal of Appeal	554
Ferro-Concrete	554
The Architectural Association Summer Visits	555
The London County Council	555
Applications under the 1894 Building Act	555
Court of Common Council	557
Correspondence :—	
King's Norton and Wrexham Schools Competition	556
Illustrations :—	
The Alliance Assurance Company's Building, St. James's-street	556
Busbridge Hall	556
Royal Exchange Buildings, City	556
Offices, Catherine-street—as Originally Proposed	558
Competitions	558
Book Received	558
The Student's Column	558
Obituary	560
General Building News	561
Appointments	562
Sanitary and Engineering News	562
Foreign	563
Miscellaneous	563
Legal :—	
District Council's Rejected Award	564
Action against Builders by Sub-Contractors	564
The Action against the Warblington Urban District Council	565
The London Building Act	565
Patents	565
List of Competitions, Contracts, etc.	566
Some Recent Sales	571
Meetings	571
Prices Current	571
Tenders	572

The Paris Salons.

NEITHER of the two Salons can be said to be at its best this year; in the New Salon especially the works that are of any real interest are few and far between, and in the Old Salon there cannot be said to be any work which in importance and excellence combined is of the highest rank; many of the best things, artistically speaking, are to be found among the smaller paintings which, though admirable in themselves, do not come into the most important class of pictures of the year. Yet, for a visitor who has the patience to pick them out from among the crowd of exhibits, there are plenty of good pictures to be found.

The large room (I.)* at the top of the second staircase contains, as usual, two or three immense decorative paintings which are commissions for the decoration of public buildings. The most important of these is M. Roussel-Géo's painting of a street scene in Paris the day after the taking of the Bastille, intended for the Council-room of the Hôtel de Ville of Ivry. It represents a joyous crowd, with the street architecture as a background, running, shouting, waving flags and emblems, etc.; it is entirely realistic as to drawing, but is kept in a very low and light key of colour, which removes it from realism, and the whole effect is sufficiently bright and decorative. M. Delacroix' long pastoral picture for the Salle des Fêtes of the Hôtel de Ville of Solesmes has a fine restful effect, and the groups are interesting in themselves; it is in fact a long harvest field, the horizon marking a level line along the centre of the composition, and occupied by separate groups designated (from left to right) "Fiançailles," "La Moisson," "La Voiture" (the hay-cart), "Les Glaneuses," and "Sérénité"—the last represented by a shepherd, with his sheep folded, watching the rising moon. There is both decorative effect and poetic suggestion in this. But the most important decorative exhibit is that of M. Henri Martin, who has a whole long room (XVI.) to himself for his decorations for a gallery in the Capitol of Toulouse, together with 87 small figure and landscape studies which went to the making of the two large pictures. These occupy the two long sides of the gallery, painted in M. Martin's well-known *pointelliste* manner, the paint laid on in thick ridges (no wonder the colour-shop trade is said to be a prosperous one in Paris). One side represents the river with the town on the further bank, in a glow of rich colour; in the foreground the nearer bank is peopled with various promenaders whose costume is not of a decorative character, but the whole effect of colour and sunlight is very fine; and the other picture, which represents the fields and reapers, with wooded hills beyond and the long shadows of the trees across the foreground, is beautiful both in general effect and in the design of the figures and groups. The whole is a really great achievement in decorative painting. M. Quost's "Panneau Decoratif" for the Ministry of Public Instruction (XXXIII.) is not symbolical of public instruction but is simply decoration—a long panel broken by a pilaster near each end, in which groups of flowers spring up along the front in one plane but of irregular heights; garlands are festooned along the top of the canvas, and in the rear is a faint hazy background of woodland, with an architectural balustrade curving out on each side to the centre of the picture—all this kept in faint and delicate tones; the result, as a wall decoration, is exceedingly pretty; two smaller panels of the same type are exhibited in the same room. The Old Salon also contains two or three of the class of designs to be executed in Gobelins tapestry which the French artists, or some of them, understand so well. The most important of these is M. Cormon's Jean de Berry buying objects of art at Bruges, only the landscape background is too pictorial in character for tapestry; it was probably considered necessary to show the town as a background; but the foreground, with its assemblage of rich detail, presents work admirably suited for translation into tapestry.

Two of the largest and most prominent pictures of the year are mistakes; both by eminent painters, one of them pre-eminent, if we may put it so. M. Gervais, who has painted finely some

*The numbers in brackets throughout this article represent the number of the room in which the work mentioned is to be found, which may be useful to any of our readers who intend to visit the Salon. To give the catalogue number of a work is useless, as the numbers follow no order, and the finding of them is a mere matter of chance.

great subjects of antique legend, has chosen this year to represent the ill-behaviour of the Centaurs, at the marriage of Hippodamia (XVII.), when, having drunk too freely, they seized on the ladies and carried them off. The picture is, of course, a tumult of galloping and overthrown figures, hard in execution and too grotesque to be agreeable; drunken and shouting Centaurs come out too realistically in painting, they do better in sculptured metopes, where there is no attempt at illusion. The other picture referred to, by M. Rochegrosse, is a production one regrets to see from a man who has done some really fine things; it is entitled "La Joie Rouge" (XXXIII.), and appears intended to symbolise the outbreak of the savage instinct in human nature; a horde of furious figures surging from the back of the scene and trampling over and killing women and children in wanton slaughter. As a work of art it has nothing to recommend it; it is violent, coarse, and exaggerated both in action and colour; but this offensive production is labelled "Acquis par l'Etat"; why, it is difficult to understand. The State and municipal purchases out of the Salon seem to be in general prompted by the desire to secure pictures which point a moral suitable for the instruction of the crowd in public galleries—at least, that is the only way to account for most of them; but what moral is to be pointed by M. Rochegrosse's fantasia of slaughter is a mystery.

Having noticed some of the principal large decorative works, we may now take the rooms of the Old Salon in their order of numbering, just pointing out what is best worth looking for in each, so as to render this article something of a practical assistance, to any of our readers who may be visiting the exhibition, in finding out the best works with less trouble than they might otherwise have, among the crowd of pictures which are of but mediocre interest. In the large (room I.) at the head of the staircase, hang the two large landscapes by M. Didier-Pouget, one of them a repetition of what he has often painted—a high foreground of heather and a valley partly in mist behind it. He has done this as often and as regularly as Mr. Peter Graham has done his Highland hills and cattle, but it is so well done that one can hardly complain of the repetition. His other landscape, a moonrise effect, is rather hard and precise. An interior by a Dutch artist, Herr Pieters, a *genre* picture on a large scale, is worth looking at. Room III. contains two or three good landscapes, and M. Brispot has made an interesting little picture (IV.) out of the readers at the bookstalls on the Quai Voltaire, a little bit of Paris life which was worth preserving. In Room V. we come on one of the most perfect works in its way of the year, M. Bail's interior, "La Laiterie," just a painting of a dairy and its customers, but as perfect in style and execution as any example of the Dutch school in the National Gallery, and yet not so merely realistic; there is a certain breadth of style about it which we do not find in the Dutch School. M. Brouillet's picture of the return of Quinet and Michelet to their lecture-room at the Sorbonne in 1848, and the cheers of their listeners, after being expelled through political clamour, is a State Commission for the decoration of the Sorbonne, interesting as a historical record, and with plenty of vigour in its representation of the scene, and as such not to be passed over, though not of the highest pictorial value. This room contains two of the best nude studies in the exhibition, by M. Benner and M. Béroud, the latter of whom, by an odd fancy, has grouped a lion with the lady. M. Clairin's "Ame Vivante des Siècles Mortes" is a curious and interesting picture, a kind of allegory; the idea seems to be that of the survival of the spirit of ancient Egypt, above the modern personages sleeping in the foreground; winged visionary figures flutter about, like the ghosts of the past; it is a fanciful and poetic work.

The portrait of M. Injalbert (VII.), the eminent sculptor, by M. Calbet, is one of the most straightforward and unpretending portraits in the exhibition, where the tendency is to over-elaborate portraits with a profusion of ornamental accessories: one can pardon this, however, in such a work as M. Chartran's sumptuous portrait of the Maharajah of Kapurthala (IX.); the richness of a magnificent oriental costume and equally magnificent throne were too tempting to a painter; and after all, what is an Oriental potentate without his blaze of ornament? M. Injalbert, member of the Institute, may be painted in a quiet grey coat, but an Eastern potentate must have his exterior splendour. But we have passed over the two charming works of M. Paul Chabas (VIII.), of which "La Nageuse," a young girl swimming in the sea, no one should miss, the whole thing is so fresh and charming, and so perfectly carried out, even to the effect of refraction on the part of the body that is under water; it is not an intellectual picture, but it is full of the joy of health and beauty. Mdme. Demont-Breton's child on the seashore, "Le Coquillage," is in the same room; not quite equal to some of her former works of the same kind.

M. Debat-Ponsan's large picture symbolising two torrents leaping down the rocks (XI.), in the shape of two exceedingly robust young women, is too large to pass over, and the painter has a good name, but his work here is rather amusing than anything else. Far more satisfactory are M. Dupré's two quite small pictures of rural landscape and figures in the same room, which might easily be missed if not looked for, but are quite perfect in their unity of style. A landscape by M. Maurice Chabas, in the same room, is an interesting example of the effect of *pointelliste* execution; it is called "La Rayons Dorés à Port Maneck"; on a near view it looks perfectly dead in surface, like worsted work; but look at it from the other side of the room, and the effect of the light on this ridged surface of pigment gives the effect intended—that of a southern landscape in exceptionally strong sunlight. It is curious to contrast this with M. Biva's two pond and woodland scenes (XII.), which represent the most absolute and uncompromising realism—so real that it is almost optical illusion; not of course the highest form of landscape painting, but yet if a man has a special talent for this particular kind of effect, it is better he should use it than do something else not so well. A decorative picture for a room in M. Rostand the poet's house, in the same room, should be looked at for its fine colour.

We may skip several rooms now (M. Martin in Room XVI. we have already paid our respects to) till we find in Room XVIII. a landscape of another type from those last mentioned. M. Harpignies' one contribution, "Le Ruisseau," an upright forest landscape with an open distance. Style in landscape painting can reach no greater perfection than this; it is not realistic, it is nature translated into painting, omitting some detail only to get greater unity of effect, and yet the feeling of nature is entirely preserved. If M. Harpignies recalls Constable—a Constable with somewhat more self-restraint and a tenderer feeling for colour, M. Humbert, in his portrait of a lady (XXI.) recalls Gainsborough, and is equal to Gainsborough too. This is a somewhat interesting room in its varieties, for here we have M. Hébert producing a modern Virgin and Child picture almost in the manner of a *primitif*—a beautiful work of its kind both in colour and in its spiritual expression, and a few paces from this we find him exhibiting one of the brightest and most characteristic little portraits of a modern lady to be found in the exhibition, and which should by no means be overlooked, as it easily might be; it is a small picture in one corner of the room, a cabinet portrait. It is rather distressing, after looking at these beautiful and refined works, to see in Room XXIV., one of the angle octagon rooms in which, it must be admitted, the best things are never put, a specimen of what French art of the day can degrade itself to, in M. Gorguet's big ceiling picture for one of the Paris Mairies, representing a sort of Pierrot and Columbine group; a man in a fancy dress with a tall hat, others in fantastic dresses carrying Chinese lanterns; and this seriously and permanently to be painted on the ceiling of a public building at the expense of the Municipality! It is really melancholy; a whitewashed ceiling would be preferable, for it would at least be inoffensive.

Sea-painting is not a strong point with the French; they do not like the sea well enough; but M. Jamar's "L'Océan" (XYXI.) is a really good sea; a coast scene on a cold day grey with a long stormy swell rolling in; and, by the way, the artist is not a Frenchman after all, but a Belgian both by birth and residence. M. Tattegrain, who is French to the backbone, also relies this year mainly on a sea-painting, showing a coasting craft "Désemparé" in a tremendous sea—"désemparé" is a mild way to put it, for she will be swamped by the next wave; but the sea is really fine, and far superior to most storms in French seas, for we do not imagine their sea-painters rough it at sea as ours do, and hence when they imagine a gale they are apt to overdo the sublime; but still, this is a grand and effective painting. We have passed over, in coming to it, one of the most remarkable works of the year, M. Robert-Fleury's painting of Marie Antoinette waking in prison on the day fixed for her execution.

It seems almost too cruel a subject to choose, and yet it is as well that the present generation of Frenchmen, who for the most part glory in the Revolution, should be reminded of the way a high-minded though misjudging queen was hounded down and trampled on. The picture is painted with simplicity and with no striving after dramatic effect; the mere facts as pourtrayed are enough; the queen in her shabby dress and looking almost old with misery, the female guardian who has a sort of half pity for her, and the yawning lout of a sentinel stretching himself in his chair by the window—these look real, and the reality is enough; it is a very impressive bit of historical painting.

M. Zwiller's homage to Henner (XLI.) is one of the noteworthy works of the year; is it a very clever imitation of Henner's style, representing the mild and dreamy nymphs whom Henner painted coming to mourn over his tomb. A picture belonging somewhat to the same class is to be found in the large gallery (I.). M. Béroud's imitation of the composition of Veronese's Marriage of Cana, the personages who fill the scene being composed of figures from well known Renaissance paintings, as well as some of the figures of the painters themselves. The idea is well carried out and the picture (not on a large scale) is rich and pleasing in colour, but it is rather a question whether it was a fancy worth the talent displayed over it.

As the Salon authorities profess to have rather made a move lately in the direction of recognising applied art, we may direct the visitor's attention to the case of M. Lalique's work in the middle of Room IX. (one of the corner octagon rooms) as an example of the "French taste" which we hear critics belauding so at present. The principal object in this case is a large silver bowl or urn, entirely decorated with, or rather composed of, huge metal lizards, by no means well or delicately modelled, which crawl up the sides, while others form a radiating pattern at the top. Anything more hideous or more detestable in taste it would be impossible to see, and the only thing one would like to do with it would be to treat it as Hezekiah treated the brazen serpent—stamp it down and grind it small to powder. And this is the French taste in decorative work, which our silly newspaper critics talk about and applaud!

The immense array of sculpture in the central court is not, taken as a whole, as remarkable as in some previous years, but it contains some very fine works, of one or two of which we may be able to give illustrations. M. Dubois' monument to Fromentin, to be erected at La Rochelle, is the best of the central series of monuments or memorial works on a large scale; the bust of Fromentin, to which the treatment of the drapery gives great sculptural breadth, is on a lofty stele, beside which an Algerian cavalry soldier rears his horse (Fromentin's life and art were much connected with Algeria). Among the best of the leading works is M. Cordier's fine group "Le Doute," a youth whom a lean sarcastic-looking old man is plying with sceptical criticism; as a piece of expression in sculpture it is remarkably powerful. M. Frémiet exhibits a realistic portrait statue of Rude, the great sculptor, seated and contemplating a model of his winged figure on the Arc de l'Etoile. M. Michel, a classical sculptor *par excellence*, has a fine figure representing "Autumn"; M. Peyre's group, in one alcove, entitled "Offrande à Venus," is a fine composition; and M. Guilloux has a fine and interesting work entitled "La Nouvelle Muse"; the muse of antique art is seated on a fragment of a Doric column, the new muse (apparently Music) standing by and over her with a countenance expressive of energy and aspiration; it is not only a fine composition but expresses a new idea. There are many other things worth looking at in the vast collection of sculpture, including some powerful and successful treatment of subjects bearing on modern life, in which the sculptor's art is used to express a moral meaning, in some instances with great success and in a manner not at variance with artistic conditions, though this cannot be said in all cases.

The New Salon is a very poor collection, only relieved here and there by a few fine things, such as M. Lhermitte's landscapes (XIII.), M. Iwill's Venetian scenes (X.), some good portraits by MM. Carolus-Duran, Besnard, Gervex, and others. M. Béraud has painted a scene of the expulsion of nuns from a convent (XVII.), which has a present-day interest as a subject picture. Among the large decorative pictures M. Auburtin's "Orphée" (purchased by the State) is the only real success, but architects may find some interest in M. Koos's ideal picture of building operations, under the significant title, "Mens agitat Molem." Among other things worth looking at are M. Berton's "Femme et Fleurs" (XIV.), a whole room (XVIII.) filled with works by the late M. Carrière—ghosts of pictures, we call them; M. Guillaume's little picture, "Le Reveil" (X.); M. Lerolle's "Femme dans les Fleurs" (VI.); M. Le Sidaner's contributions (XV.) in his usual style of artificial light effect; M. Morissot's "Le Repos" (I.), a fine nude study in a rather unusual style; M. Picard's "Femme dans un Loge" (XI.); and M. Roll's life size "Dragon" and his little idyll "Journée d'Eté" (VI.); his "Après la Douleur" one had better turn one's back upon. Some of the things that are hung are beyond belief in their crudeness, ugliness, and absurdity, and lead to the conclusion that it is high time the New Salon were abolished, if it is reduced to filling up its walls in this way.

LIABILITIES OF TRADE UNIONS.

THE case of Denaby and Cadeby Main Collieries, Ltd., *v.* Yorkshire Miners' Association, in which the House of Lords have affirmed the judgment of the Court of Appeal, is one of interest when the liability of trade unions is under consideration. The strike, which was the cause of action in this case, commenced in June, 1902, and was advocated by certain branch officials. The men engaged in it were under fortnightly contracts, and these they broke, and in consequence the Supreme Council of the defendant association refused to grant strike pay, and advised the men that the strike was illegal. When, in July, 1902, the men offered to resume work, they were required to enter into new agreements, which said agreements contained some regulations as to timbering which had been issued by the Home Office. The men objected to these agreements and continued the strike, and in this action they were supported not only by the branches but by the Supreme Council, and the defendant association granted strike pay. It was subsequently held by the House of Lords, in the case of Howden *v.* Yorkshire Miners' Association, at the suit of one of the members of the association, that this payment of strike pay was not authorised by the rules of the association, and he was granted an injunction to restrain them from further paying it.

The present action, shortly stated, was brought against the association and certain of its members for having instigated the strike and encouraged the men to break their contracts; the jury had found against the defendants on a long series of questions left to them by the judge at the original trial. The facts of the case are too complicated to be entered into in detail here, but the Lord Chancellor carefully considered the relationship of the central authority to the branches and the rules regulating strikes as made by the association; and the House of Lords unanimously came to the conclusion that liability for the action of the branch agents had not been brought home to the central authority, and that the action against the association failed. It is to be observed that no strike pay was authorised until after the period when the contracts between the men and their employers had terminated.

This case having been decided in favour of the Trade Union under the law of agency as it at present exists, may well raise the question as to how far any alteration in that law is really a necessity. If the central authority acts lawfully, and endeavours to restrain its members within the limits of the law, this case shows that its funds are abundantly protected by the law as it stands.

NOTES.

The Workmen's Compensation Bill.

AN important extension of the scope of the Workmen's Compensation Bill was made in Committee last week. The Bill, as originally drawn, excluded from its provisions employers of less than five men. In other words, the small jobbing builder or plumber was to a considerable extent allowed to be outside its provisions. This limitation has been struck out in Committee, and the Bill when it becomes law will, therefore, apply to workmen of every employer. It would unquestionably be a hardship on a workman that he should not be able to obtain compensation because his master has not half-a-dozen workmen. It is said that the small employer has to pay a much larger premium than the more important employer. It is impossible, however, to say that this is a good reason for excluding his workmen from the benefit of the Bill. If the small employer is liable to pay compensation he is more likely to have sound materials, such as scaffolding, and

if he cannot afford to pay the necessary premium he had better not be in business at all. But, as a matter of fact, the premium will, in one form or another, be paid by the customer. Any such exclusion as first appeared in the Bill could only be temporary, and it is best that the new Act should settle the law for some time to come.

Smoke Abatement.

MUCH credit is due to the Coal-Smoke Abatement Society for their efforts to dissuade manufacturers and others from the habit of presenting fuel to the inhabitants of London in the unusable and inconvenient form of smoke. In the annual report of the Society presented last week it is pointed out that, during the past year, 1,057 cases of smoke pollution were reported by the society's inspector, and that 1,000 complaints relative to the constant emission of black smoke were forwarded to local authorities. In spite of this, however, only fifty-five summonses were issued, a fact which shows how reluctant public bodies are to perform their duty, in respect of smoke abatement, to the people whose representatives they are. If these lagging councils would take a proper view of their responsibilities, owners of factory chimneys would soon realise the practical economy attending the complete combustion of fuel, and the people of London would have reason to rejoice. It is really a scandal that the most important work of the Society should be the arousing of local authorities to a sense of their responsibilities in this matter.

Preferential Railway Rates.

THE opinion expressed in these columns when this vexed question has been more than usually prominent, that the evil was rather exaggerated, seems to be borne out by the report issued this week by Lord Jersey's Committee. This body was appointed in response to strong complaints of a general nature to the effect that home industries were being prejudiced by preferential rates enjoyed by foreign competitors, with a view to ascertaining how far these complaints were warranted by actual facts and figures. The conclusions arrived at by the majority of the committee were that the evidence failed to show that the railway companies are giving undue preferential treatment to foreign and colonial produce as compared with home produce, contrary to existing legislation, and that there has been a marked absence on the part of complainants to avail themselves of the existing remedies in the case of any infringement of the law. The latter, they add, is sufficiently strong and effective to justify them in declining to recommend any further legislation—in which they confirm our own impression.

East London Water Supply.

FROM the proceedings at the last meeting of the Metropolitan Water Board it seems that a serious hitch has arisen with regard to such parts of the Metropolitan Water Board (Lea Valley) Bill as relate to the scheme for the construction of intercepting sewers, sewage disposal works, and a new intake at Feilde's Weir. This is a very important scheme for the improvement of supplies drawn from the River Lea, and it is to be regretted that the Board have resolved to withdraw it for the present. The fact is that the local authorities in the valley are not willing to co-operate without placing excessively onerous conditions on the Water Board, the War Office have come forward with demands in respect of their works at Waltham Abbey, and numerous petitions have been lodged against the project. As we understand the matter, the new works are only necessary because the local authorities and the War Office have chosen in the past to pollute the river instead of making provision for sewage disposal in a proper manner, and these delinquents now hope to saddle the Water Board with an excessive proportion of the outlay necessary for restoring the river to its original state, so far as practicable, and for giving the inhabitants of East London the opportunity of drinking water instead of sewage solution. We fully sympathise with the anxiety of the Local Government Board that the Bill should proceed, and hope that they will put pressure on those who are responsible for its temporary withdrawal. We all know that district councils object to expend money on such prosaic objects as drainage systems while there is a chance of wasting it upon ambitious undertakings such as council halls, electricity supply works, and tramway systems, but they must be taught their duty to the public, and there is reason for hoping that assistance in this direction will be forthcoming as a result of the new *régime* established at the Local Government Board.

The San Francisco Disaster.

WHILE the amount of damage caused at San Francisco by the recent earthquake is sufficient justification for the prominence given to the subject in the European press, it is worthy of note that similar results followed the convulsion throughout an extensive region along the pacific Coast. The actual centre of disturbance was near San José, some 50 miles south of San Francisco, where the business portion of the city was wrecked and many lives were lost. No injury was sustained, however, by the buildings or instruments of the Lick Observatory in the same neighbourhood—a fact which speaks well for the shock-resisting qualities of high-class masonry. At Leland Stanford University, 34 miles south of San Francisco, the memorial church, library, gymnasium, power-house, and other buildings were demolished, but the Encina Hall, the chemistry building, and the inner quadrangle remain practically uninjured. At Santa Cruz, 121 miles south of San Francisco, various public and other buildings were destroyed, but no lives were lost. To the north of San Francisco, Santa Rosa and other towns in the Sonoma Valley suffered severely, but others seem to have escaped almost entirely. Owing to the strict rules of martial law in San Francisco no unofficial examination has been made of the buildings in that city and no detailed particulars are available as to the condition of buildings in other places along the Pacific seaboard, but sufficient information is forthcoming from various sources to show that substantial masonry buildings, as well as steel-frame structures, offered successful resistance to earthquake and fire. The greatest trouble at San Francisco after the first shock was, as already observed, the lack of water owing to the breakage of the mains, and it would certainly be a wise precaution for the authorities to insist upon the provision of a large tank on the top of every building, so as to establish an auxiliary supply of water for the use of the fire department in case of need.

Old Houses.

LESSEES of old houses should note the decision in the case of Torrens *v.* Walker. The plaintiff had in 1890 taken a lease of the first, second, and third floors of a house in Glasshouse-street for eighteen years, the lease containing a covenant on the part of the lessor to keep the outside of the house in good repair. In 1905 the walls of the premises, which were some two hundred years old, were found to be so worn as to be dangerous, and the County Council served a notice under the Building Act requiring the owner to take down the front and back walls as being dangerous. The lessee communicated this notice to the lessor, and vacated the premises. The Court, in an action by the lessee for breach of the covenant, held that as there is in law no breach until notice has been given, and the first notice was that above given when the premises were pronounced to be dangerous and irreparable, the lessee had no ground of action for breach of covenant, since the house by that time was impossible of repair. Whether the lessee apart from the covenant has any remedy against his landlord it is not for us to say, but the lesson to be derived from the case is that lessees should not delay in giving their landlords notice of want of repair until the house has ceased to exist as a house.

Drain or Sewer?

QUESTIONS arising out of the distinction between "drains" and sewers have not recently been so much before the Courts, but the point arose once more in the case of Harvey *v.* Busby (May 2). The case turned upon the effect of the Metropolis Management Act, 1855, which gives the local authority power to make orders as to the combined drainage of contiguous houses, and which by sect. 250 enacts that drains so combined by order shall be drains and not sewers. In 1878 the owner of three houses in Hackney, numbered 21, 23, and 25, had obtained an order for the combined drainage of these houses. In 1879 an order by the same owner was obtained to drain four other houses by combined drain, these houses being numbered 27, 29, 31, and 33. The plan attached to the application showed that the intention was to drain these into the pipes at the rear of the other houses, which formed part of their combined drainage system. This apparently was never carried out, for it was found that 27 alone was drained with 21, 23, and 25, whilst the remaining houses drained elsewhere. This deviation from the order as approved has had the effect of converting the system behind the houses 21, 23, 25, and 27 from a drain into a

sewer, and a nuisance having occurred by a defect in the pipes behind No. 25, the local authority failed to make the owner liable. The case at present is only shortly reported, and it does not appear what the present ownership of the houses is or who was responsible for this deviation from the order for combined drainage. The addition of one house to the original houses has nullified the effect of both orders, since the houses are differently grouped.

The Surface Finish of Concrete Structures.

WITH the object of securing a uniform colour and surface for the exterior of concrete buildings, a mixture of cement mortar and crushed stone is very frequently applied to the outer mould before the concrete proper is deposited. In this way a perfect bond between the facing and the body of the work is assured, and by careful selection of the sand and stone it is not difficult to obtain a finish of satisfactory colour and appearance for concrete work, providing the outer film of cement is washed out before it has thoroughly hardened, so as to leave the sand and stone exposed. The necessary removal of the planks forming the side of the mould can easily be effected by situating the uprights a few inches away from the face of the work, securing the planks by cleats and wedges. In order to prevent the joints between successive layers of concrete from showing, triangular beads are sometimes employed, leaving an imprint along each joint, and relieving surfaces which would have a somewhat dreary aspect if left perfectly plain. This method of treatment has been largely adopted in the United States, and a recent example of it in this country is furnished by the new concrete-steel bridge built by Mr. S. S. Platt, M.Inst.C.E., over the canal at Rochdale.

The Cooling of Cast-Iron.

THE changes of volume that take place during the solidification and cooling of metals and alloys, are of much practical importance, and it is to be regretted that the general subject has been so little studied in Great Britain The paper, therefore, read last week by Professor Thomas Turner, of Birmingham University, to the Iron and Steel Institute should be received with welcome by those who make and use castings—especially iron castings. In American iron-foundries different forms of apparatus have been adopted for measuring the changes of volume of cast-iron from the moment it begins to solidify until it reaches atmospheric temperature, and in this way it has been shown clearly that iron expands before shrinking to its final volume. Professor Turner now gives some results of the experiments conducted at Birmingham University upon iron and other metals, by the aid of very simple and inexpensive apparatus. From the diagrams presented in his paper it is seen that the curves obtained may be divided into four classes, according to the number of arrests observed in the normal rate of contraction. Thus, the curve given by pure electrolytic copper is uniform and there is no arrest of volume as the metal cools; the curve given by white iron exhibits one retardation during contraction which may or may not lead to actual expansion; and the curves given by grey hematite and Northampton iron show two and three expansions respectively. Of course, other curves than those of the sharp and definite character indicated in these diagrams are obtainable when different mixtures of iron are under examination, and for this reason the method adopted by Professor Turner affords the iron-founder a ready means of checking and controlling his foundry mixtures, and if intelligently interpreted the curves obtained furnish reliable information as to the chemical composition. the hardness, and the strength of the metal.

Wireless Telegraphy.

IN the *Journal* of the Institution of Electrical Engineers, published last week, there are two papers of great interest on Wireless Telegraphy by Dr. Erskine-Murray and Lieutenant Tissot respectively. The former describes some of the recent advances that have been made in the application of electromagnetic waves to industrial purposes, and also elaborates a theory to account for some of the recently discovered phenomena. In the first place he accounts for the fact that the intensity of the signals received diminishes inversely as the distance instead of inversely as the square of the distance by making the supposition that the rarefied air in the upper layers of the atmosphere is conducting. Hence the waves, instead of spreading into space, are confined to the lower layers of the atmosphere. It will be remembered that Mr. Tesla made a similar supposition several years ago in order to account for the propagation of signals across the Atlantic. Dr. Murray also accounts for the fact that it is easier to signal at night time than during the day by supposing that some of the radiations from the sun make the air a better conductor for electricity, and so the waves are damped out more readily. He mentioned that on H.M.S. *Vernon* signals had been received from Poldhu at a distance of 180 miles by a wire down one mast, whilst at the same time signals were sent to another ship 50 miles away by a wire from another mast. It appears to be easy to arrange so that many stations can send signals simultaneously without interfering with one another, but it would be easy for an expert to time his receiver so as to intercept any of the signals being sent. At present secrecy can only be obtained by using a code for the signals. It is interesting to notice that the power required for the new Machrihanish station in Cantyre for signalling to America is about 70 horse-power, whilst it is rumoured that Marconi will use 200 horse-power in his new Transatlantic stations.

The Growth of Wiesbaden.

FEW places in Germany increase more than the town of Wiesbaden. It was only three or four years ago that the fine theatre and opera-house, with its magnificent foyer, was opened. Now the Kurhaus is being rebuilt. When completed it will be a large building, with a central block surmounted by a dome, and with two long wings. The lake in the grounds has been drained, and will be laid out as gardens and shrubberies: When this building is completed there will be few places in Europe with a finer *ensemble* than this part of Wiesbaden. There will be the theatre, the Kurhaus, and opposite it the Kaiser Friedrich platz, with its fine hotels. The number of these, too, has within the last two years been sensibly increased, and fine buildings they are. Internally, as the phrase is, may be found every modern convenience; externally the designs, if somewhat florid, are in keeping with the general character of the architecture of Wiesbaden—a garden city of the best kind.

St. Marylebone Court House: and London Watch-Houses.

IT is stated that proposals are entertained for the building of municipal offices for the Borough of Marylebone, in place of the inconvenient and wholly inadequate quarters now supplied by the Court House at the south end of Marylebone-lane, near Oxford-street. The present building embodies one of the few watch-houses now remaining in London. Above the east door is a finely-modelled achievement of what we take to be the coat-arms of Harley, with a difference, with an angel and a lion rampant for supporters, and a coronet; beneath is "A.D. MDCCXXIX." A lower tablet bears the inscription—

ST. MARY-LE-BONE WATCH HOUSE
REBUILT A.D. MDCCCIV.

Lady Margaret Cavendish Harley, only daughter and heir of Edward, second Earl of Oxford, brought the Marylebone estate in marriage to William, second Duke of Portland, in 1734; but the Portland property passed some years ago to Lord Howard de Walden. Of the old parish watch-houses which have survived to our own time may be mentioned the (later) St. Giles's Round House in the Coal-yard—now Goldsmith-street—which was taken down in 1884 for the erection of new almshouses adjoining Barley-court; one in a corner of St. Botolph's churchyard, Bishopsgate Without, built, as its tablet records, in 1771, but latterly converted into a shop in the main street; and that in the churchyard of St. Anne's, Soho, adapted as a mortuary. The watch-house adjoining the east end of St. Sepulchre's, Holborn, was built in 1791, close to the site of St. Stephen's Chapel of that church. The "Watch and Engine House" in Collingwood-street, at the south-west side of the churchyard of Christ Church, Blackfriars-road, bearing an inscription stating it was built in 1819, was converted into a mission-hall; another is that of St. Botolph's, Aldgate, in Houndsditch.

The Modern Gallery.

AT the Modern Gallery there is a small exhibition of oil sketches of Natal by Miss Percival-Clark. The colour in most of the sketches is rather curious; we suppose that the effects of mauve sky and pink distance are a peculiarity of the country; they are certainly un-English, and very effective. The interest of many of the pictures is a good deal enhanced by association. One of the best sketches is of "Spion Kop" (16), in which the dark foreground and hazy pink distance make a very striking contrast. "The Tugela, near Harts Hill Station" (18) and the

same from Pieters Hill (26) are also very successful paintings. Miss Percival-Clark's skies are as a rule very good; "A Summer Morning at Hilton Road" (2) is a very nice open-air effect with a clear sky.

The French Gallery.

AT the French Gallery in Pall Mall there is on view a rather heterogeneous collection of works by artists living and dead, among which we notice two really fine though small examples of Troyon, a small study of a stag by Rosa Bonheur, and an excellent pastel landscape by M. Lhermitte. The feature of the exhibition is a collection of the works of Herr Tholen, which are good work, but not specially remarkable.

AT THE CHÂTEAU DE BAGATELLE.

ON Friday last week was the private view of a small loan exhibition of pictures and a few works in sculpture organised by the Société Nationale des Beaux-Arts at the Château of Bagatelle in the Bois de Boulogne, now, as our readers are probably aware, the property of the Paris Municipality, who purchased it two years ago from the heirs of Sir Richard Wallace, whose property it was previously. The Château, which is a pretty long walk or drive from the barrier at the Porte Maillot, is reached *vid* the "Porte de Madrid" and the Boulevard Richard Wallace, and turning to the left out of the latter into the drive leading to Longchamps, a little on the left stands the small Château. This is really the back entrance to the grounds near the stables; the principal entrance is at the other side of the estate, by a drive entered through a handsome iron gateway; but it is the entrance easiest of access from the city, and the best for driving, as the gate here is close to the house; the other one is a long way off, and vehicles (apparently) are not allowed inside the park.

The exhibition now open is, we believe, the first successfully organised one in this building, which was bought, as already mentioned in one of our Letters from Paris, with the intention of making the house the scene of various special exhibitions, a matter which seems to have been mismanaged so far. The present exhibition is one of the works of deceased French artists, and is not of the highest interest; but the Château and park (now open to the public) are well worth a visit on their own account, in summer weather at all events, for it is essentially a summer residence.

The property of Bagatelle consisted, originally, of a small "Pavillon de Chasse" belonging to Mdlle. de Charolais, daughter of Prince Louis de Condé. It subsequently became the property of Comte d'Artois, brother of Louis XVI., who afterwards reigned under the title of Charles X. This prince built, on the site of the Pavillon de Chasse, a small Château at first known as "La Folie d'Artois," but which subsequently took the name of Bagatelle. This building, very rapidly executed, cost 600,000 francs. After a number of vicissitudes it became the property of Sir Richard Wallace, who built the one-story pavilion at the side of the forecourt, in which the exhibitions are now to be held. The château, the new pavilion, and the park were sold by Sir Richard Wallace's representatives to the municipality of Paris in 1904, for six and a half million francs.

On entering the grounds and turning to the left, you find yourself in a large oblong forecourt to the right of which is the one-story pavilion in white stone, standing on a terrace with a recessed portico with Ionic columns, containing a suite of rooms which form the exhibition galleries. Although this building is larger on the ground plan area than the principal Château, and carried out in the same style of graceful classic architecture, it is obviously only an annexe to the Château proper, which faces the visitor at the further end of the forecourt, and is an exceedingly graceful two-story classic house in white stone, decorated with an order nearly the full height of the building, and with busts in circular medallions, and the motto "Parva sed Apta" in raised letters on the attic over the centre. On the other side of the house, on the same axis as the forecourt, is a terrace and a long lawn with raised walks at the sides and a fountain basin in the centre, and opening on the terrace on this side is a small but beautiful circular salon, projecting as a semi-circular bay on to the terrace, the interior going up both stories and finishing in a gracefully decorated domed ceiling. It is an ideal residence *de luxe* on a small scale, as far at least as the ground floor suite of rooms is concerned. The house is open to the public, and contains some works of art which are there permanently; but the chief interest is in the suite of rooms and the exterior and surroundings of the house itself.

As to the loan exhibition in the other house, it contains a good many works by well-known painters and sculptors, both living and dead, the definition of it as an "exposition retrospectif" only signifying that it does not include new works first exhibited. A good many of the works are studies and sketches by eminent painters; but the collection also includes finished pictures by MM. Roll, Carolus-Duran, Gervex, Lerolle, etc., among living artists, and by Boudin, Cazin, and J. Lewis Brown among deceased artists, and studies and sketches by Meissonnier, Puvis de Chavannes, Burne-Jones, and others. There are some rather noteworthy works in sculpture by Mdme. Marie Cazin (chiefly in the forecourt outside), and a curious essay in what may be called *genre* sculpture by M. Bartholomé in the shape of a portrait statuette of a lady, in modern costume, seated on a sofa.

In the bright weather of Friday the 11th at Paris (almost like a June day) the real attraction was not so much the pictures as the park, a perfectly beautiful sylvan retreat, apparently pretty fairly kept up, at all events it has not been open long enough to the public for them to have spoiled it much yet. On a public holiday it would very likely be crowded, otherwise it is too much off the general public routes to be much frequented. As we have said, the place is well worth a visit, independently of any exhibition, when the weather is such as to show it at its best.

MAGAZINES AND REVIEWS.

THE *Quarterly Review* contains a very judicious article on "The Pre-Raphaelite Brotherhood," ostensibly a review of Mr. Holman Hunt's autobiography and of some other books bearing on the subject. The general conclusions of the writer as to the bearing of Pre-Raphaelitism on modern art are exceedingly just. As a matter of detail, we quite agree with him that in the "Lorenzo and Isabella" Millais was consciously painting a picture in early Italian style. At that date, as the author remarks, Millais was a consummate master, and could give to his paintings any look he liked. The entire difference of style in the picture which shortly succeeded this, "Christ in the House of His Parents," is a sufficient proof that Millais was merely, in the "Lorenzo," making a kind of excursus into the primitive style as an artistic exercise. "Trade Unions and the Law" is an able summary of the situation from the point of view of common sense and logic, which under present conditions are unhappily little consulted in connexion with such questions.

To the *Art-Journal* Mr. Bernard E. Ward contributes an article on the fascinating subject of brush-work drawing, which is such an admirable medium for teaching firmness and sweep of line in drawing. Besides some practical examples, a fine coloured design by Mr. J. W. Nicol, based on the tulip, illustrates the article. Mr. Claude Phillips is continuing his series of articles on the pictures in the Wallace collection. An article on "Art Handiwork and Manufacture" contains, among other things, some charming examples of modern lace made at the Royal Irish Industries Association.

The *Architectural Record* (New York) has an article by Miss Katharine Budd on Saragossa, illustrated with a number of sketches. The sections of some of the wide-spreading wood-built cornices are very interesting. We cannot say that the architectural treatment of "The Griswold—a Study in Hotel Building" seems worth the long article bestowed on it; the description of the planning and construction is of some interest. The Morgan Library and Art Museum, New York, by Messrs. McKim, Mead, & White, is a fine building treated exactly in the right manner externally, for an art museum. A chapter on some of the Baldwin pianos, which looks rather like an advertisement of a piano-making firm, serves to introduce some designs for pianofortes, of which the "grand" at the head of the article is a fine and artistic specimen. The materials used were satin-wood contrasted with amaranth (a purplish-hued wood), and the floral marquetry is executed in holly, maple, redwood, walnut, and prima vera, "shaded to resemble natural flowers by means of hot sand." We do not like that last item, but the whole design seems to be one that would have been worth detailed illustration on a larger scale. Of the two upright pianos illustrated, that in a kind of "art nouveau," with legs that look as if they were of some substance half melted down, is hideous, the more so in contrast with the clean lines and refined appearance of the design described as "Sheraton."

In the *Burlington Magazine* Mr. Weaver's article (No. 6) on "Some English Lead-work" deals with the subject of leaden portrait statues, of which some illustrations are given. Mr. Yates Thompson contributes an article on "The Romance of a Book," the French illuminated MS. of Josephus, in the Bibliothèque Nationale, a page of which is reproduced in black and white, as well as some others of its pictorial decorations. "The Development of Rembrandt as an Etcher" is the first instalment of a serious critical essay by Mr. C. J. Holmes, who treats the subject not only in reference to Rembrandt himself but in reference to the development of the capabilities of etching as illustrated in his work, which Mr. Holmes considers to be a remarkable instance of the truth of Reynolds's celebrated and often-contested dictum that "genius" was largely the result of intelligent labour—that Rembrandt obviously acquired his final power as an etcher by a long struggle with the difficulties of this form of art.

The illustrations in the *Berliner-Architekturwelt* show that the evolution of grim tower monuments in honour of Bismarck is still exercising the minds of German architects in competition designs, three of which are illustrated. They were probably submitted in a competition instituted by some municipality which desired to be in the fashion by having its own "Bismarckthurm"; no information on the subject is given. They are, however, rather fine conceptions of a gloomy ideal architecture. They are all by one architect, Herr Brurein, and have a strange pre-historic appearance, as if they might have been built in the Stone Age.

Public Works includes, among other interesting papers, one by Mr. Tullis on "Belt Engineering," the making, fitting, and management of belting for conveying engine power. Readers who are not conversant with the subject may think that belt-working seems a very simple matter, as it does when you see the belts in operation; they may be surprised to learn how many points have to be seen to and how many causes of failure guarded against, before the satisfactory working of belting in a large mill can be secured. M. Cottancin, perhaps one of the best authorities on the subject included in his title, contributes an article on "Reinforced Concrete Theatre Construction in France."

The May issue of *Concrete* is full of useful information; we may mention particularly an article, under the heading "New Uses for Concrete," on reinforced concrete chimneys. After mentioning brick and steel as two suitable materials for tall chimneys, and the drawbacks to both—the friction from the joints in a brick chimney, and the expense of maintenance and shortness of life of a steel chimney, the writer proceeds, under the heading "Monolithic Chimneys":—

"The third form seems to meet the requirements to a far greater extent. Monolithic concrete is smooth on the surface, a non-conductor of heat, requires no lining to resist any temperature, at least up to 1,500 deg. F., requires no expense for maintenance, and, because of its inherent properties, becomes stronger and better with age. As to first cost, the three usually rank—steel, concrete, and brick. As to final cost, they almost invariably shift

this order to concrete, brick, and steel. The difference even in first cost between concrete and steel is rarely so great as to warrant the use of steel for this reason for any but temporary purposes. The ground space, which is often very important, is economised to the greatest extent by the use of reinforced concrete—the saving over brick being about one-third. Until the development of a suitable system of reinforcing concrete it is impossible to use it in tall chimney construction, the tensile strength of concrete being insufficient to economically resist the wind stresses."

A section and plans of a reinforced concrete chimney are given, which, from the photographic view appended, appears to have been actually erected, though the locality is not mentioned. It is a very ugly thing, looking like an immense narrow tube set on end, and we should be sorry to see the type come into general use unless its economic and structural advantages are great and incontestable. It is possible to make a large brick chimney a rather fine thing, but evidently this cannot be the case with a concrete-steel one, except by adopting proportions which would be wasteful.

The *Art-Workers' Quarterly* is largely occupied with criticisms on and illustrations of work at the recent Arts and Crafts Exhibition. Mr. Alan S. Cole contributes an article on some "Phases of Old English Embroidery." The volume is full of interesting illustrations of applied art design, including a coloured plate of a charming wall-paper designed by Mr. Walter Crane.

Mr. Julius M. Price writes an article in the *Fortnightly Review* on "The Cradle of Modern British Art," which, interestingly written as it is, shows a most extraordinary perversion of view as to facts. The writer appears to be himself an old Paris art-student, and his "Cradle of Modern British Art" is France; the advance of British art to-day being stated to be largely due to French influence. It is absurd to say so; certain painters are obviously influenced by French methods and study, and if there were more of French influence in our landscape-painting it would be better; but the advance of English painting as a whole is due more to the Pre-Raphaelite movement and the influence it left behind it than to anything over the Channel. He laments the possible downfall of the "English school" under French influence, while the very complaint of French critics is that the English have no "school," only individual painters with individual methods. As to the "cradle" question, why, the cradle of the present great school of French landscape painters was actually in England; they are the descendants of Constable. Best of all, he asks us to believe that the improvement of English taste in applied art of late years is due to French influence! Why, English applied art at the present moment is as far superior to French as light to darkness, and its great advance in recent years is due wholly to influences within this country—to William Morris more than to anyone else. Our conclusion is that Mr. Price must be an American.

In the *National Review* an article by Mr. J. R. Macdonald, M.P., on "The Ethics of the Trade Disputes Bill," is an amusing, or should we rather say an unblushing confession of the views of the Labour party as to the respective rights of Trade Unions and employers. A great part of the paper is of course employed in showing the enormity of the idea of making Trade Unions pecuniarily liable for injury and loss caused by their action or that of their agents. The following quotation is sufficient to indicate Mr. Macdonald's ideas of logic and of the rights of man:—

"A Union in dispute with an employer pickets his premises, drives away his customers, damages his trade. The loss is assessed, and has to be made good from the union funds. The employer in dispute with his workmen locks out his men, prevents them from finding work elsewhere till peace is restored, hurls them down from a tolerably secure footing upon the cliff face of life into the depths of poverty and debt below. How can the victimised workman pursue his employer for damages? But such a claim on the part of the workman is the counterpart of the claim for compensation for injured property and profits on the part of the employer."

That the Union is interfering with another man's business, while the employer is dealing with his own, is of course a trifling difference which it is not worth while to take into consideration. According to the writer's logic, it would seem that a man who is employing and paying labourers is *ipso facto* under a moral obligation to go on employing and paying them, whatever demands they make on him, and they are to claim compensation because he refuses to do so. It is something beyond comment!

In the *Contemporary Review* Mr. L. March-Phillipps writes a most able article on "Pre-Raphaelitism and the Present." His main point is that the Pre-Raphaelites, after having started with the profession of going straight to nature and putting nothing between that and art, really became mediævalists who entirely separated art from life as it is; and that Morris was the only one of the band who really took the practical view of seeing what could be done with the art of the present (though, in our opinion, he was not quite practical enough).

"While Holman Hunt retired to Palestine to foster his devotional instinct, while Rossetti ranged all history like a wild beast in search of the choicest morsels of sentiment, while Burne-Jones cowered in his studio, dreaming of things that had never happened in a world that had never existed, while Ruskin raved of cusps and crockets, and cursed modern factories and the Great Western Railway—in a word, while, in one way or other, all the leaders of the movement seemed to have made up their minds to cut their own age and their own country, Morris alone, divining more truly what the mediæval spirit consisted in, had flung aside all æsthetic and other squeamishness, and turned to help English craftsmen and English craftsmanship to regain what they had lost."

Blackwood contains a long and interesting article on "The Early Royal Academy." It is a review of Messrs. Hodgson & Eaton's recent book "The Royal Academy and Its Members," but introduces a good deal of the personal opinion of the writer. His estimate of the character of Reynolds, and of the worldly wisdom and tact which assisted the great President in founding the Academy on a strong basis, is good, and emphasises a side of Reynolds's character sometimes overlooked. We note with sympathy also the dry remark in the first column, that while the writer has views, which a Panhard should not drag from him, on the Academy's administration of the Chantrey Trust, "we have also had visions, which shall be equally uncommunicated, of that Trust administered by some of its critics." So have we.

We recommend those who want to understand what "peaceful picketing" really means or may mean to read the examples cited by Sir Herbert Maxwell, from his own experience, in his eloquent and forcible article in the *Nineteenth Century* under the title "Why Lift Trade Unions Above the Law?" the whole of which is a protest of the most forcible kind against the mob tyranny of the working man and his allies with which we seem to be every day more and more threatened.

The *Century* has an article on "The Gardens of Cornish," a small new Hampshire town in which there seems to be a great interest taken in the development of the beauty of gardens; the illustrations, however, do not indicate much in the way of the artificial treatment of gardens. A short paper on "The Architectural Treatment of a Small Garden," by the late R. Riordan, forms a further comment on the subject, which seems to condemn the Cornish gardens, as the writer says (truly) that the smaller a garden the more necessity is there for treating it with a certain architectural severity. We see no trace of this in the illustrations of the Cornish gardens.

Scribner contains an article on "The Railways of Africa" by Colonel Girouard, with some illustrations of some of the bridges and other works. The author remarks on the fact that the one-mètre gauge has been chosen for the British-made Uganda railway, in spite of the fact that the 3 ft. 6 in. gauge was already established for most of the railways of Africa, some 4,000 miles of 3·6 gauge being already in existence when the Uganda railway was projected. It certainly seems unfortunate that a hindrance should thus have been thrown in the way of establishing a universal though rather small gauge for the South African railway system. Under "The Field of Art" Mr. Russell Sturgis contributes a second article on "Colour Prints," illustrated by a frontispiece to the magazine of a moonrise scene, which is successful in effect, but in a very simple scheme of colour.

The *Cornhill* contains an article on "Prehistoric Man on the Downs" by Dr. Hubbard and Mr. G. Hubbard, which is apparently practically an embodiment of the two lectures of which a report is published in this issue; but it is accompanied with sectional diagrams and a plan which are useful in elucidating the subject. "Carbon and the Shapes of Atoms" is the subject of the fourth of Mr. Shenstone's series of articles on "The New Chemistry"; and Mr. G. D. Hogarth contributes an interesting article on "Chimæra and Phaselis" in Asia Minor.

The *World's Work* prints three articles under the heading "Shall there be a Channel Tunnel?"; of course in favour of it. We agree that the old scare as to danger of invasion through a tunnel had little in it, the protection of the exit on this side would be so easy, and the immediate destruction of its continuity, in case of necessity, still easier. But we suspect the engineering difficulties, and especially that of adequate ventilation, are being much underrated. The great use of such a tunnel would be for goods traffic, as doing away with the necessity for trans-shipment on each coast. Even if made, we should question if it would ever be popular for passenger traffic. The risk of sea-sickness is a trifle compared with the risk of being choked.

The *Antiquary* contains a detailed account of the steps which have been taken by the Hertfordshire County Council, at the instigation of the East Herts Archæological Society, to take under their charge and to safeguard the archæological relics of Hertfordshire. It is stated that Hertfordshire is the only county which has so far availed itself of the permissive Act of 1900 to undertake the care of ancient monuments; if so, it has set an example which it is to be hoped that other county authorities will follow. The Rev. A. H. Collins contributes an article on the carvings at Barfreston Church, with illustrations of some of them.

In *School* Mr. Sydney F. Walker, whose articles on the hygiene of school buildings we have before noticed, devotes his chapter on "The Ventilation of School Buildings" mainly to the description of several methods of ensuring ventilation, giving a large space to a description of the "plenum" system, without expressing an opinion on it, contenting himself with giving the main facts as to the working of such a system, and a statement in a short concluding sentence of the advantages and disadvantages attributed to it. The summary is correct and useful.

THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE fourteenth general meeting (ordinary) of the session will be held on Monday, May 21, at the conclusion of the special general meetings announced below, when a paper will be read by Mr. Paul Waterhouse on the "Report of the London Traffic Commission." The special general meeting summoned by the Council under by-law 60, on the requisition of Messrs. Alfred W. S. Cross, Max Clarke, C. H. Brodie, George Hubbard, T. P. Figgis (members of the Fellowship Procedure Committee), Ernest George, Alfred B. Yeates, Edmund Wimperis, T. W. Cutler, Mervyn Macartney, William A. Forsyth, and J. R. Best, will be held to receive the Report and recommendations of the Fellowship Procedure Committee appointed at the meeting of March 5.

The Fellowship Procedure Committee recommend:—(1) That the regulation under by-law 9 be amended by omitting all the words after "respective proposers," and adding the year in which the candidate was articled, and in the case of a candidate for Fellowship the year in which he commenced practice; the regulation further to state that the voting papers shall be in the form of the papers issued for the election of the Council. [The present regulation under by-law 9 reads as follows:—"The voting papers shall state the name and address of every candidate, with the names of his respective proposers, and be divided into columns for affirmative and negative votes, such votes only to be counted as are marked in such columns."]

The Committee also recommend:—(2) That the direction to voters printed at the foot of the voting paper should read as follows: "1. The voter (Fellow or Associate) is to strike out in ink the name of any candidate for whom he does not wish to vote. All

names not so struck out will be counted as voted for."

The Committee further recommend:—(3) That a notice be printed in bold type at the head of the voting paper urging the importance of the papers being returned.

The Chairman will move, in accordance with recommendation 1, that the regulation under by-law 9 be amended so as to read as follows:—"The voting papers, which shall be in the form of the voting papers issued for the election of the Council, shall state the name and address of every candidate, with the names of his respective proposers, the year in which he was articled, and, in the case of a candidate for Fellowship, the year in which he became engaged as a principal in the practice of architecture."

The Chairman will further move that recommendations 2 and 3 of the Fellowship Procedure Committee be adopted.

A special general meeting, convened by the Council under by-law 60, will then be held for the following purpose:—The Chairman to move that the resolution passed at the special general meeting of May 7 be confirmed, as required by clause 33 of the Charter. The resolution is:—"That the President and members of the Council for the current session do retain office until the conclusion of the Seventh International Congress of Architects, to be held in July, and that, in order to give legal effect to this resolution, the provisions of by-law 30 affected thereby be temporarily suspended."

THE SURVEYORS' INSTITUTION:

THE EFFECT OF FIRE ON BUILDING STONE.

AN ordinary general meeting of the Surveyors' Institution was held on Monday, at No. 12, Great George-street, S.W., when Mr. W. R. Baldwin-Wiseman, M.Sc., read a paper on "The Effect of Fire on Building Stones."

In the course of his remarks he said that the temperature and destructiveness of any conflagration were so entirely dependent upon the plan of the building, the nature and disposition of the material used in its construction, the nature of its contents, the time, location and cause of the fire, and other incidents, as to preclude all possibility of reduction to any standard formula, and a study of the stresses which a building had to withstand during and after a severe conflagration was also so complex a problem as to be practically indeterminate if viewed as a whole; but if one resolved it into separate considerations of design and material, it was brought more within the bounds of solution and the range of every-day practice in design. For this reason he regarded as practically valueless all experiments which involved the construction of, say, a model room, and its destruction by fire, when, in many cases, the building material of which it was composed was comparatively fresh, the wall and floor stresses were trivial, and the internal space was utterly inadequate for the generation of a really serious fire. Far more profitable experience would result from a careful inspection of all interiors after the extinction of a fire, for much information as to the temperature of the fire could be obtained by a careful examination of the condition, fused or otherwise, of the metallic fixtures, and by tabulating the records of the intensity and destructiveness of fires in various buildings of similar plan, structural arrangement, and trade, one would create an almost invaluable record for reference, from which much good must eventually result.

The purpose of the author's research was not so much to determine the design of a building for fire resistance as to estimate the ultimate stability of an edifice after subjection to a severe conflagration, and to afford some small assistance to those who might be called upon to decide whether demolition or reconstruction should succeed the wrecking influences of a big conflagration. The following points were considered:—

"First.—The transverse and crushing strength of stone: (*a*) when thoroughly dried in the steam oven so as to expel all absorbed water held in the pores, but not the water of crystallisation; (*b*) when thoroughly soaked in water; (*c*) when subjected for various definite periods to constant temperatures ranging from 500 deg. C. to 820 deg. C., and either slow cooled in air or suddenly cooled by immersion in cold water, immediately upon removal from the furnace, the latter case being intended to somewhat imitate the conditions when a jet of water was directed upon a burning building. Second.—The expansion of the stone with increase of temperature from 20 deg. C. to 300 deg. C., and the permanent alteration in dimension on subsequent cooling."

For the whole of the data of that part of the research bearing upon expansion and permanent swelling the author acknowledged his indebtedness to Mr. O. W. Griffiths, B.Sc., A.R.C.S., with whom he is collaborating in another research on the physical properties of concrete and ferro-concrete, and who had specially devised a delicate extensometer for the determination of the data on expansion recorded in tables given in connexion with the paper.

In heat resistance, or the depreciation in strength of stone after subjection to high temperatures, there was not, so far as he was aware, any statistical table whatever, and, in fact, the only tabular statement at all on this question known to him was that of Dr. Cutting, giving the order of resistance in decreasing ratio of fire-resisting material, when water was not applied, viz.:—(1) Marble, (2) limestone, (3) sandstone, (4) granite, (5) conglomerate. The accuracy of this table was not at all borne out by the data derived from his (the author's) research, and from this tabular arrangement he most strongly dissented, since the physical structure of each class and subclass of stone varied so considerably as to preclude any generic grouping such as this list presumed. There were doubtless many isolated examples in personal experience of the relative effects of fire on different stones in the same edifice, but these were unfortunately not readily available. In 1878 the granite body of the Church of St. Peters, Laverton, was demolished whilst the freestone tower stood intact, although the heat was sufficient to destroy the granite sills and jambs in the tower, and to melt the bells in it, the temperature being, say, about 850 deg. C.

The stones tested by the author were selected to be as representative as possible of the geological formation and geographical distribution of those more commonly used in construction in this country; in all, twenty-four classes of stone were experimented upon, of which six were sandstones, nine were limestones and calcareous freestones, six were marbles, and three were of igneous origin.

The author then briefly described the stones, after which he gave a description of the apparatus and methods of making the tests. All the test-pieces were dressed to strips 6 in. by 1 in. by 1 in. excepting the marbles, which were 6 in. by ½ in. by ½ in., the red granites 6 in. by 1 in. by ½ in., and the quartzites 6 in. by 1¼ in. by 1¼ in. The granites and marbles were also polished upon one face. All the test-pieces were carefully inspected to insure that they were free from flaw or crack. Each stone was placed in the electrical furnace, and its temperature regulated and maintained constant throughout the experiment, which usually lasted from three to four hours. It was then allowed to cool, and the permanent swelling observed after twelve hours' cooling.

Discussion of Observed Data: A. *Structure and Appearance.*

Considering first those experiments for the determination of the strength of the stone, there were several phenomena worthy of recording. Many of the Doulting, Portland, and Bradford test-pieces emitted a peculiar crackling noise during the first five minutes after insertion in and removal from the furnace; the York stone changed in colour from a straw yellow to a terra-cotta red, due possibly to a chemical change in the composition of the iron oxide in the cementing material of the grains of the stone. The diabase changed from a dark greenish black to a dirty yellowish green; the Monks Park, Portland, Hopton Wood, and Boxground stones became chalky in appearance and somewhat lighter in colour; the Hopton Wood stone became internally mauve-grey in colour, and developed brown stains here and there; the Bradford and Bath oolites lost their fresh crisp appearance, became more or less earthy, and developed irregular red stains round some of the larger grains. The Aspatria test-pieces, soon after their insertion in the furnace, gave off a dense smoky cloud, which soon after flashed and burnt steadily, with a smoky yellow flame for about a minute. By trituration of some of the crushed stone with alcohol and subsequent distillation of the alcohol, a viscous amber-coloured combustible oil was collected. Several stones, such as Doulting, disintegrated in the furnace or immediately after removal therefrom. Others, such as Doulting or Daresbury, disintegrated immediately on immersion in or removal from the water; and one Daresbury retained its form during cooling, and carried its own weight upon the supports, but broke when the stirrup, weighing only two pounds, was carefully placed upon it, and fell as a mass of incoherent sand to the floor. Some, such as Doulting, Carrara marble, the red and, in a less degree, the grey granite, the Bradford and Bath oolites, and the Daresbury sandstone, had but little cohesion, and crumbled to powder when touched, or when more or less coarsely rubbed with the hand. Several Carrara marbles warped upon cooling, arching slightly; others, such as Hopton Wood, Monks Park, and Boxground stones, retained a sharp arris but the sides caved in, and cracks more or less deep developed at right-angles to the direction of the greatest length of the test-piece.

B. *Strength.*

All the bars tested transversely failed, as one would expect, in tension—*i.e.*, broke on the under surface immediately after developing cracks running from the underside upwards. If one considered a rock mass as an aggregation of similar or dissimilar interlocking grains or crystals, then, when this mass was subjected to a high temperature, each of these grains expanded, or tended to expand, with varying amount in different directions. To permit of this individual expansion of the grains or crystals, each and all would move outward; but upon subsequent cooling they would not move back to the positions they originally occupied, but each would contract along its own axes about its own individual mass centre, resulting in a less intimate interlocking of the crystals or grains and a consequent diminution of the strength of the mass as a whole. If, on the other hand, the temperature be suddenly reduced through a considerable range, as when cold water was brought into contact with the heated stone, then the molecular stresses set up by this sudden change of temperature, coupled with the disruptive tendency of the heated and expanding water which had obtained access to the innermost pores, tended to a further reduction of its strength. The strength of the stone in some cases was insufficient to maintain its own outward form, or so slight as to carry no load of even moderate magnitude; whilst, in other cases, the original strength was materially reduced when heated and slowly cooled in air; and still further depreciated, with exceptions, when suddenly cooled in cold water. There was a still greater diminution of strength with increase of the temperature, or of the period of exposure to the same high temperature. This question of diminution of strength was not at all one of heat decomposition of the calcareous constituents of the stone. Care was taken that all the test-pieces of the same stone were of similar dimensions, so as to be readily comparable, and that all were tested when resting upon their natural bed. The ratios have been calculated to the third place of decimals, but, as stones in the same geological formation might vary in structure and chemical composition from point to point, and from district to district, similar experiments might produce results differing in the second or third place of decimals. Considering his Tables 2 and 3 as a whole, it was evident that there could be no class grouping into sandstones, limestones, etc., of the fire-resistance of stones, such as Dr. Cutting presumes in his classification.

Taking the several items in detail, and taking the resistance to crushing and transverse loads when dry, in tons per square foot to the nearest ten tons, as the standard of comparison, one saw that York stone, which had a crushing strength of 550 tons per square foot, and a transverse strength of 70 tons a square foot, or a strength only ⅛th of that in compression, deteriorated after subjection to high temperature, so that its resistance to crushing was only 36 per cent. of its original crushing strength when slowly cooled in air, or 40 per cent. when suddenly cooled in water, whilst its transverse strength was only 65 per cent. and 27 per cent. respectively, of its initial transverse strength when slow and fast cooled, so that

if a fairly high factor of safety had been chosen in the original design, a structure built of this stone might yet be serviceable, with certain safeguards, after a serious conflagration. The red Mansfield stone had a crushing strength of 160 tons per square foot and a transverse strength of 40 tons, or a transverse strength only quarter of that in compression; its crushing strength after subjection to a high temperature and the two modes of cooling was 100 per cent. and 87 per cent. respectively, whilst in cross-breaking the strengths for the corresponding conditions of cooling were 62 per cent. and 60 per cent., so that, although the deterioration in resistance to cross-breaking was material, it was not of such magnitude as to seriously impair the utility of a well-designed edifice, still less was this the case in regard to compressive stresses.

The Aspatria stone was somewhat similar to the red Mansfield stone, in that its resistance to crushing and transverse stresses was 160 and 30 tons respectively, a ratio of 5 to 1, and the post-conflagration crushing strengths are 100 per cent. and 99 per cent. respectively, but it differed from the red Mansfield stone in that there was a more marked depreciation in its resistance to transverse stresses, to 20 per cent. and 15 per cent. respectively, so that if this material had to withstand crushing stresses only, its deterioration may under ordinary circumstances be negligable, but its depreciation in transverse strength was so material as to necessitate grave consideration in the matter of its replacement.

The Quartzite, which had the moderately-high crushing strength of 240 tons per square foot, and the phenomenally high transverse stress of 150 tons, over twice the transverse strength of the York stone and five times that of the Aspatria stone, had a ratio of crushing to transverse stress of 8 to 5. It depreciated in compressive strength to 71 per cent. in both cases of slow and fast cooling from high temperature and in transverse stress to 89 per cent. and 93 per cent. respectively. The comparatively moderate diminution of its strength in compression and cross-breaking made it a valuable stone, and as it was possessed of a good colour and appearance, especially when polished, it should command an extensive market, not only for building purposes but also as road metal, for which its hardness and the cleanliness of its surface especially commended it.

The soft Daresbury sandstone, with but little natural cementing material, had the comparatively low-crushing and transverse strengths of 60 tons and 10 tons per square foot respectively, a ratio of 6 to 1; its resistance to crushing after both modes of cooling was practically nothing, as was likewise its resistance to transverse stresses when fast cooled; when slowly cooled, however, its resistance to transverse stresses was about 48 per cent. of its original strength. It was possible that some small, but purely academic, values could have been obtained for the depreciated crushing strengths, but it was not possible with his apparatus, since one was unable to apply the first 100 lb. or 200 lb. with any reliable degree of accuracy.

The hard Daresbury sandstone being more coherent offered a greater resistance to crushing and cross-breaking than the soft Daresbury sandstone, the breaking stresses being 130 tons and 20 tons per square foot respectively, a ratio of 6 to 1; but after subjection to high temperatures its resistance to crushing, when cooled in any manner, was so trivial as to be negligible; so also was its resistance to transverse stresses when fast cooled. When slow cooled, however, its transverse strength was 24 per cent. of the maximum, so that, although initially twice as strong as the soft Daresbury sandstone, its depreciation of strength was twice as great, and both broke under practically the same load; or, in other words, the heat had the effect of entirely breaking down the efficiency of the cementing material, on which its greater initial strength depended.

Turning to the consideration of the calcareous freestones, one found almost as varied a diversity of strengths as among the sandstones. The Doulting stone, which had a crushing strength of 80 tons and a transverse strength of 20 tons per square foot, a ratio of 4 to 1, offered little or no resistance to crushing after subjection to high temperatures, for in most cases it fell into an incoherent mass of shelly fragments and sand, in the furnace, or whilst cooling, or soon after placing on the table of the crushing machine. Under transverse loads its resistance fell to 2 per cent. and 7 per cent. respectively of its maximum strength, so that at a moderately high temperature it had no fire-resistance value whatever.

The Portland base bed stone, the strongest of all the calcareous stones which he tested, had a crushing strength of 260 tons and a transverse strength of 90 tons per square foot, a ratio of 3 to 1. This subsequently depreciates after subjection to high temperature to 60 per cent. and 51 per cent. in crushing strength, and to 66 per cent. and 14 per cent. in transverse strength respectively, when slow and fast cooled, so that one saw that the local action of the water in suddenly cooling the stone materially depreciates its strength under both conditions of loading.

The Monks Park stone, with a compressive strength of 100 tons and a transverse strength of 40 tons per square foot, a ratio of 10 to 4, depreciates in compression to 82 per cent. and 74 per cent. respectively, and in transverse strength to 43 per cent. and 37 per cent., so that, in sustaining crushing loads, it might within certain limits be trusted after a conflagration to perform its office, but could not be trusted to sustain any severe transverse stresses.

The Boxground stone, with crushing and transverse strengths of 60 and 30 tons per square foot respectively, a ratio of 2 to 1, depreciates in compression to 49 per cent. and 54 per cent. of its original strength, when slow and fast cooled, and depreciates in transverse strength to 2 per cent. and 24 per cent. respectively; so that, whilst it might, with due precautions, serve again in compression, it could not be trusted to bear any transverse loads whatever.

The Bradford stone, with crushing and transverse strengths of 60 tons and 30 tons per square foot, a ratio of 2 to 1, deteriorates so that its strength, after subjection to high temperature, was 50 per cent. and 40 per cent. of its initial compressive strength, and 34 per cent. and 23 per cent. of its initial transverse strength.

The Bath stone, with slightly greater resistances to crushing and transverse stresses of 70 tons and 40 tons per square foot respectively, a ratio of 7 to 4, deteriorates similarly to 51 per cent. and 45 per cent. in compression, and to 35 per cent. and 26 per cent. in transverse loading. The depreciation in strength of both the two previous stones was so great as to render them untrustworthy after subjection to a severe conflagration.

The Hopton Wood stone, with crushing and transverse strengths of 190 tons and 60 tons per square foot respectively, a ratio of 3 to 1, depreciates in compression to 57 per cent. and 39 per cent. respectively, and when transversely loaded to 39 per cent. and 29 per cent.

The Chalks, with their low initial strengths of 20 tons and 10 tons per square foot respectively, had no residual strength whatever, after subjection to the high temperature, the expansion set up by the high temperature in all probability serving only to rupture the walls of the pores and break up the material.

The marbles also varied somewhat in the magnitude of the depreciation of their strengths. The Carrara marble, with initial compressive and transverse strengths of 290 tons per square foot, and 50 tons per square foot, a ratio of 6 to 1, depreciates to 55 per cent. and 66 per cent., and to 19 per cent. and 9 per cent. of the respective strengths, when heated and cooled in the two prescribed modes.

The Rouge Royal marble with compressive and transverse strengths of 410 tons per square foot and 120 tons per square foot respectively, deteriorates to 55 per cent. of its initial compressive strength when cooled in either way, and to 33 per cent. and 24 per cent. of its transverse strength when slow and fast cooled.

The St. Anne's marble, with compressive and transverse strengths of 590 tons and 140 tons per square foot respectively, a ratio of 4 to 1, depreciates to 38 per cent. and 45 per cent. in compression, and to 34 per cent. and 27 per cent. in transverse strength; this stone was remarkable in that it depreciates in an almost identical ratio in both strengths when slowly cooled.

The Dove marble, with a compressive strength of 380 tons per square foot and a transverse strength of 140 tons per square foot, a ratio of almost 3 to 1, depreciates in ratios somewhat similar to those for the Carrara marble; its compressive strength diminishing to 50 per cent. and 41 per cent. respectively, and its transverse strength to 8 per cent. and 15 per cent. according to the two modes of cooling.

The Black marble, with an initial resistance to crushing of 430 tons, and to transverse loads of 190 tons per square foot, a ratio of 2 to 1, depreciates in crushing strength to 61 per cent. and 70 per cent., and in transverse strength to 59 per cent. and 14 per cent. This marble and the Portland stone exhibited the most marked depreciation of resistance to transverse loads, when suddenly cooled from a high temperature, and to a lesser extent the Belgian granite displays similar qualities.

The Belgian granite, which had a considerable vogue owing to its uniformity of texture and its comparative cheapness, had a compressive strength of 350 tons per square foot and a transverse strength of 130 tons per square foot, a ratio of about 3 to 1, depreciates to 59 per cent. and 69 per cent. in compression, and to 46 per cent. and 22 per cent. respectively when transversely loaded.

The three types of Plutonic rocks with which he experimented exhibited a greater diversity in the depreciation of their strengths than all the other classes of stone. Thus the red granite with initial crushing and transverse strengths of 350 tons and 90 tons per square foot respectively, a ratio of 4 to 1, depreciates to 8 per cent. and 6 per cent. in crushing strength, and to 10 per cent. and 6 per cent. when transversely loaded; at once indicating the absolute inutility of granite as a fire-resisting medium; comparable only in its utter depreciation with the poorer sandstones and calcareous freestones.

The grey granite, with slightly higher initial crushing and transverse strengths of 380 tons and 170 tons per square foot respectively, a ratio of about 2 to 1, depreciates to 33 per cent. and 51 per cent. in crushing strength, and to 11 per cent. and ½ per cent. in transverse strength, so that this stone, although it greatly deteriorates, did not so utterly fail in compression as the red granite; doubtless owing to the somewhat smaller and more uniform size of its component crystals, giving rise to less internal disturbance during expansion and contraction; and it should be noted that, as with York stone, Box-ground, St. Anne's marble, black marble, and the Belgian granite, the crushing strength was slightly increased when suddenly cooled, compared with that when slowly cooled, doubtless, because the sudden cooling at the surface gave rise to an intimately interlocked skin; but the grey granite failed more absolutely under transverse loads than did the red granite, owing to its smaller-sized grains.

Finally the Diabase, with compressive and transverse strengths of 3 0 tons and 120 tons per square foot respectively, a ratio of 3 to 1, depreciates to 86 per cent. and 50 per cent. of its initial crushing strength and to 24 per cent. and 5 per cent. of its initial transverse strength when slow and fast cooled, so that it might within limits be trusted in compression after subjection to the high temperature of a conflagration, but could not be at all trusted under transverse loads.

The effects detailed at length in the preceding paragraphs were more marked if the period of exposure be prolonged, or if the temperature be materially increased; thus York stone exposed for two hours to a temperature of 618 deg. C. had a residual strength of 43 per cent., which, after six hours at a temperature of 696 deg. C., diminished to 35 per cent., and after twelve hours at a temperature of 728 deg. C., diminished to 28 per cent., so also red Mansfield stone after subjection for similar periods to similar temperatures had residual strengths of 58 per cent., 49 per cent., and 33 per cent. respectively.

Excepting for the relatively non-absorbent marbles, granites, and quartzites, and the

more absorbent Hopton Wood stone, the transverse strength of a stone when thoroughly dry was materially greater than that for the same stone when its pores were thoroughly charged with water; whilst the same general rule held for the crushing strength, if to the list of those already enumerated be added the York, Red Mansfield, and Aspatria sandstones, and the Doulting stone. So that a fire in a moderately old building would be productive of more havoc to the structure than in a new one, as the stone would not have the high initial strength of his test-pieces, but would be depreciated to an extent, depending on its relative exposure to diurnal and seasonal variations of temperature, the composition and destructiveness of the atmospheric impurity, the relative porosity of the stone, the inequality of its texture, and the incidence of wind, rainfall, and frost.

c. *Expansion.*

The sandstones as a class had the greatest coefficients of expansion in the first range of temperature from 20 deg. C. to 100 deg. C., the coefficients varying from 9 millionths for Aspatria stone to 16 millionths for the Quartzite; in the higher or second range of temperature, from 100 deg. C. to 200 deg. C., there was an increase of the coefficient to 1·5 times that at the lower range in the case of the Red Mansfield as the greatest rate of increase, and 1·1 times that at the lower range for the Hard Daresbury as the least variable. In the highest or third range of temperature from 200 deg. C. to 300 deg. C., there was a greater variation in the rate of change of the coefficient than in the two previous ranges, the coefficient for the Red Mansfield being 1·9 times that in the first range, whilst that for the Aspatria and the Quartzite remain practically constant at the value for the second range. In general, the sandstones exhibit least variation in their rate of change at the higher temperatures, but the initial mean coefficient of expansion in the lowest range was so high that the uniformity was more apparent than real.

The Oolites exhibit a most marked diversity at all temperatures, the Doulting stone having the greatest coefficients of expansion in all three ranges, the values being 22·4, 26·2, and 26·7 millionths respectively in the first, second, and third ranges.

The Bradford stone had the least coefficient in the first range, the coefficient being only 2·5 millionths, which was the least value in the coefficient of all the stones upon which experiments were conducted, the Monks Park, Boxground, Portland, and Bath stones having similarly low coefficients of 3, 4, 5, and 5 millionths respectively. But with increase of temperature, the diversity was most marked, the coefficient of expansion from 100 deg. C. to 200 deg. C. considered as a ratio of that at the lower range, varying from 1·2 for the Doulting stone to 4·0 for the Bradford stone, with values of 1·6, 2·3, 2·3, and 2·5 respectively for the Portland, Monks Park, Boxground, and Bath stones; in the still higher range from 200 deg. C. to 300 deg. C. the coefficient remained practically the same for the Doulting stone, but increased to 5·4 times the coefficient in the first range for the Bradford stone, with intermediate ratios of 2·9, 3·5, 3·8, and 4·6 respectively for the Portland, Bath, Monks Park, and Boxground stones.

If, instead of the ratios of the coefficients in the several ranges, the coefficients themselves be considered, the diversity was still more apparent; thus, from 20 deg. C. to 100 deg. C., the coefficients had extreme values of 22·4 millionths, and 2·5 millionths for the Doulting and Bradford stones respectively; in the range from 100 deg. C. to 200 deg. C. the coefficients for these two stones were 26·2 millionths and 10·1 millionths, the former being the greatest coefficient in this range; but the least coefficient was now 7·8 millionths, that for the Portland stone. In the third range, from 200 deg. C. to 300 deg. C., the Doulting stone had still the highest coefficient, 26·7 millionths, the least being that of 13·4 millionths for the Monks Park stone, and the coefficients for the Bradford and Portland stones being 13·5 millionths and 14·6 millionths respectively.

The Hopton Wood stone, by its expansion and also by its geological horizons, belonged more closely to the marbles than to the calcareous freestones, in which, from a desire to avoid too much classification, he had grouped it; but, in the question of expansion, he proposed to consider it with the marbles rather than with the calcareous freestones.

In the case of the marbles, the greatest coefficient of expansion, for the lowest range of temperature from 20 deg. C. to 100 deg. C., is 9·2 millionths for the Dove marble, and the least 4·4 millionths for the St. Anne's marble; in the next range, from 100 deg. C. to 200 deg. C., the extreme ratios of the coefficients to those in the lower range, were 3·7 for St. Anne's marble and 1·8 for the Hopton Wood stone, and in the higher range, from 200 deg. C. to 300 deg. C., the extreme ratios were similarly 4·1 and 2·1 times that of the lowest range for the St. Anne's and Dove marbles respectively.

The igneous rocks in general possessed coefficients similar to those of the sandstones, the coefficients being 10·2 millionths and 9·7 millionths respectively for the Red Granite and the Diabase, but with increase of temperature there was a material increase in the rate of expansion; the Red Granite having coefficients of 17·0 millionths and 21·6 millionths in the higher ranges, from 100 deg. C. to 200 deg. C., and from 200 deg. C. to 300 deg. C., the ratios being 1·0 to 1·7 and 2·1 respectively in the three ranges of temperature; whilst the Diabase had coefficients of 15 millionths and 16 millionths at the two higher ranges, giving corresponding ratios of 1·0, 1·5, and 1·6 respectively in the three ranges.

Stones, which had almost identical coefficients of expansion in one range of temperature, had widely varying coefficients in another; thus, for instance, Aspatria sandstone, Dove marble, Red granite, and Diabase had coefficients of 9·0, 9·2, 10·0, and 9·7 millionths respectively in the range from 20 deg. C. to 100 deg. C., differing from one another only in the ratios of 100, 102, 111, and 108; in the next range, however, from 100 deg. C. to 200 deg. C., the coefficients differed in the ratios of 100, 169, 149, and 132, and in the third range, from 200 deg. C. to 300 deg. C., they differed in the ratios of 100, 168, 188, and 139 respectively, so that if two such stones were bonded together in a structure, and subjected to any considerable range of temperature, the varying expansion at identical temperatures would give rise, not only to severe molecular stresses within the material of the stone, but would also induce a disturbance in the distribution of the external stresses in the structure.

Furthermore, these four stones had coefficients of expansion in the first range of temperature, from 20 deg. C. to 100 deg. C., not greatly differing from those for iron, steel, etc.: but in the higher ranges of temperature there was a great diversity, so that in a combination of, say, granite and steel, as in the modern skeleton steel framework structure, with masonry exterior, most severe stresses must be set up during a fire by the variable expansion of the metal and stone alone, irrespective of the heat distortion of the unprotected ironwork, giving rise to a depreciation of the strength of the stone in addition to that produced by heat alone.

Again, a dissimilar stone, such as, say, the granite forming the sill, etc., in the sandstone tower to which he referred at the commencement of the paper, might by its greater expansion have to carry a greater load at high temperature than that for which it was originally designed, and this load might exceed its ultimate strength at that temperature, and one might presume that the disruptive effect of local cooling, as when a hose plays with some pressure upon one face, was greater than when cooled uniformly and simultaneously over its whole surface. From these considerations it would be at once apparent that, although the incorporation of dissimilar stones in the fabric of an edifice might, by their contrast in colour and texture, materially contribute to the artistic and architectural effects, such a miscellaneous assemblage was not to be recommended from a fire-resistance point of view, and in a less degree this heterogeneity was not, in the strictest sense, advisable, bearing in mind that the diurnal and annual variations of temperature were not inconsiderable even in these climes. Also, in designing for fire-resistance, no masonry whatever should be carried on the upper boom of a plate girder, for not only were the molecular stresses set up by the variable expansion of metal and stone injurious, but the increased deflection of the beam, under increase of temperature, induced a settlement of the masonry above it, and brought additional lateral stresses upon the masonry.

This deflection $D = \frac{WL^3}{NEI}$

Where W was the load on the beam,
L was the span of the beam,
I was the moment of inertia of the section,
N was a numerical quantity varying with the type of beam and the incidence of the load,
E was Young's modulus of elasticity.

Since, from the formula, D varied inversely with E, which decreased in an irregular manner with increase of temperature, according to Pisati's experiments, it followed that D must increase with temperature, and the beam failed to support the load it was designed to carry at a time when it was most needed.

Some of the stones had a greater percentage porosity after subjection to high temperatures than they possessed in the normal condition, so that after a conflagration, besides the tendency to distortion of the structure, induced by permanent swelling and the mere heat depreciation of the strength; the stones would take up a larger quantity of water in the pores, which would give rise to a more rapid deterioration by weathering, as well as a further depreciation of strength on account of the presence of the greater quantity of absorbed water.

Fire Statistics.

He had made every effort to obtain information as to the approximate maximum recorded temperatures of conflagrations. These temperatures would, of course, vary within wide limits, according to the local conditions, the trade, plan of the buildings, nature of the contents, etc., and the data was but very scant, for a fire captain's energies were of necessity concentrated on the work of extinction to the exclusion of all else, but much valuable information upon this point could be collected, after the extinction of the fire, by a careful inspection of all the metallic fittings of the interior of the building; there were numerous records of zinc and lead having been melted during the progress of conflagrations, or that temperatures of 415 deg. C. and 326 deg. C. were exceeded. He was particularly indebted to Mr. William Paterson, chief officer of the Glasgow Fire Brigade, who informed him that the slates of a timber shed in a sawmill fire at which he attended melted like soft metal, and had the appearance of lava; and also to Mr. J. G. Lewis, Chief Constable and Superintendent of the Fire Brigade, Blackburn, who informed him that the maximum temperature of a fire in his experience was about 600 deg. C. He (the author) was therefore of opinion that, in experimenting with stones exposed to temperatures ranging up to 800 deg. C. for periods of from two to eighteen hours, he was reproducing conditions as severe as those occurring in the more serious conflagrations.

The relative immunity of a town from serious conflagrations was largely dependent on the ratio of the height of the higher buildings in the town, to the maximum pressure on the mains, or to the greatest pressure which the engines could afford.

General Conclusion.

Finally, he briefly summarised the points of primary importance in determining the most efficient design for fire-resistance:—

1. That the edifice should in no wise be flimsy.

2. That it should be constructed of stone possessing an uniform or fairly uniform coefficient of expansion, and retaining a considerable strength after subjection to high temperatures.

3. That all combinations of different stones should be avoided as much as possible.

4. That combinations of stone and metal should be avoided, especially when the former rests directly upon the latter, even

when the metal was entirely enshrouded in stone, for stone acts as a fairly good conductor of heat.

5. That stair-wells and lift-wells should open as little as possible on to the main building, and should preferably be enclosed and glazed with wired glass from basement to roof.

6. That floor areas should not be unduly large nor corridors unduly long.

A discussion followed, and a hearty vote of thanks was accorded to the author.

HOME ARTS AND INDUSTRIES ASSOCIATION EXHIBITION.

PROVIDED one does not set himself too high a standard, a profitable hour can be spent at the twenty-second annual exhibition of this Association; the show is well set out, fills the whole of the upper gallery at the Albert Hall, and will remain open until Monday evening next.

The aim of the Association is the excellent one of reviving and stimulating craftwork in village and rural communities, the initiative coming as a rule from voluntary effort on the part of those who have at heart the welfare of the country worker. In most cases this means that not only the starting of the classes, but much of the subsequent direction, is in the hands of amateurs whose training in design has not been very thorough, with the result that much of the painstaking and really excellent workmanship is thrown away upon trivial and commonplace motives. It is only fair to make this criticism from an artistic point of view, though in other respects the objects of the Association are praiseworthy, and have often resulted in the establishment of self-supporting village industries, animated by a very real feeling for design. This is evidenced by the exhibits from the Lake District centres and from Compton, to mention only a few.

It must be admitted that the most interesting exhibits are those of industries into which art, in the ordinary sense of the word, enters but little, and among these the Irish lace from Moneyguyneen, the homespuns from the Stonehenge centre, the chairs from Lacock, and the Saxmundham baskets are all charming. Quite a large field should be open for the cottage-made chairs provided they keep to the traditional lines of the Lacock ones, and retain the rough but individual workmanship. Of large constructive work there is, of course, not much, but some softwood stained nursery furniture, made by the Chailey section of the Guild of the Brave Poor Things, is remarkably good as the work of crippled boys; in this stall also the toys are again quite a feature.

The woodcarving from Eversley and Fleet is distinctly better than the average of this kind of work shown; a couple of small barge boards, evidently for a porch, boldly carved with a "running vine," stand out from the rest of the carving. Perhaps the most ambitious piece of furniture exhibited is a chest, designed by Mr. F. A. Rawlence, and executed at Ebbesbourne Wake in connexion with the Wilton class by Mr. Foyle and Mr. Young, the village carpenter and blacksmith. The lock-plates and hinges have been decorated in a strictly traditional manner, and are in every way excellent. In other respects the metal-work shown, especially the repoussé copper, is not very satisfactory; the only exhibit in this material worthy of note is from Fivemiletown, in Ireland, some of the pieces having great merit and an original treatment. Among the textiles the Langdale display of embroidery and drawn-thread work is full of good things. Holyhead shows three magnificent panels of silk embroidery, evidently from an old design adapted, and Failand is also to the fore with clever needlework and an excellent sampler. Why are samplers so rarely worked nowadays?

There is a good deal of pottery. Mr. Howson Taylor makes a large display of "Ruskin" ware, and the Castle Hedingham centre has a stall of pots, which are nice in colour but sadly lacking in good design. A very little skilled direction would set this right; for an example of what it will do one has only to turn to the exhibit of the Birkenhead Della Robbia pottery or to Mr. Ashbee's two cases of silver and jewellery, which are almost in a class of their own.

On the whole, this is an interesting exhibition.

PREHISTORIC LIFE ON THE DOWNS.

ON Thursday evening in last week Dr. A. J. Hubbard and Mr. Geo. Hubbard lectured at the Blenheim Club, St. James's-square, on "Prehistoric Life on the Chalk Downs." The lecture was illustrated by a series of most interesting lantern slides.

Dr. Hubbard said that he and his brother proposed to consider the manner and conditions of human life during a period the antiquity of which was so great that they were not only without historical records, but could not, with more than a vague approximation, assign either a date or a duration to it. They hoped to be able to show how prehistoric men advanced from a lower to a far higher state of civilisation. In these depths of time to which they must in imagination descend, such a movement must have been, as they judged such things now, almost inconceivably slow. Thousands of years were involved. Beginning æons before the dynasties of Egypt, they found its culmination in the building of Stonehenge, and perhaps the great pyramid was 2,000 years old when Stonehenge was new. It was spoken of as the neolithic age. The neolithic men were by no means uncivilised, for they co-operated on a vast scale, and some of the works which they had left were stupendous and as permanent as the pyramids, but, nevertheless, not one word of their language had been preserved. Although the works of neolithic men could be traced more or less all over the world, they were nowhere, so far as he knew, better preserved than in the South of England, and to that district they would confine themselves. On examination they found that two stages of culture can be defined, and he called the earlier of these the "Hill Period," and the later the "Plain Period." The men of the hill period were exclusively earth workers. Their settlements were of the earth earthy, and the purpose of every part of them was purely utilitarian. Invariably they were placed upon the hill-tops, and the dominating idea of the hillmen was terror of the plains. On the uplands of the downs man's work was practically everlasting, and there the ever-renewed mantle of short, dense turf spaced itself over the surface, moulded itself to every detail, and reproduced in its green outlines the forms which were graven in the white chalk below. It was the turf which had preserved the record of a forgotten civilisation whose work was to be seen league after league upon the downs. The principal earthworks of the hill period fell into four groups:—(1) The embankment and trench; (2) the cattleways; (3) the level platforms; (4) the dew-pond. The camps were always on the top of a down, and ranged in size from comparatively small undertakings to the immense and awe-inspiring works at Maiden Castle, near Dorchester. These camps were the forts in which prehistoric man defended himself against the flint-tipped arrows of his human adversaries. The cattleways, such as at Cissbury Camp, near Worthing, showed that the cattle were herded in the camps. The level platforms, bounded by a deep slope which extended league after league at the base of the downs along the plains which culminated in the gigantic works called the "Shepherd's Steps," at Pewsey, were undoubtedly for the protection of the cattle against wolves, and this was particularly answered by the combination of entrenchment and trench on the level platform at Poundbury Camp, near Dorchester. It was evident that life could only be lived if water for man and beast could be obtained on the top of the springless and streamless downs, and there was a great deal of converging evidence which showed that prehistoric man solved his problem by means of the dew-pond. At Chanctonbury Ring, Worthing, and at Cissbury Camp there were dew-ponds of neolithic origin. Although the dew-pond was one of the most interesting and most ancient structures in this country, so little notice had been bestowed upon it that it was not so much as mentioned in the "Encyclopædia Britannica." A properly-made dew-pond was a complicated structure. It was a circular, saucer-shaped hollow of some 70 ft. or 80 ft. in diameter, and 7 ft. or 8 ft. deep, lined and, as it were, thatched with straw. Upon this straw was superimposed an impervious layer of finely-puddled clay, and this, after being well trampled by horses or oxen, was often charged with water by casting snow upon it.

Mr. Geo. Hubbard, taking up the subject, showed how, as time went on, and the mastery over the wolf became more and more complete, neolithic man could with increasing security descend into the plains. The chief characteristic of the neolithic man's works in the plain was that they were constructed in stone rather than in earth. The stones were often of huge size, and their transport and erection gave evidence of surprising engineering capacity. Amidst the maze of stone monuments of the neolithic period which might be found in many parts one might trace, though possibly incorrectly, an ascending scale in their development. The early habitations of our prehistoric forefathers were extremely small, the internal measurements of the house sometimes not exceeding 5 ft. or 6 ft., and there was an almost cyclopean massiveness in the unhewn masonry of the external wall, which was probably not more than 3 ft. or 4 ft. high. The doorways were generally clearly marked by the upright imposts, and into these huts the people must have crawled. These huge stones must have been brought together with laborious care, and it was a grievous shame to see, as he had seen, these relics of an extinct race being broken up to make road metal. Neolithic man, finding himself free from the instant requirements of self-preservation, appeared to have passed on insensibly to the development of his spiritual nature, for his structures during the plain period assumed a religious significance. Maumbury Rings, he ventured to think, formed a link between the hill settlements and the works of the plain, although it was universally referred to as a Roman amphitheatre. The structure possessed not the characteristics of Roman work, but those which distinguished the labour of neolithic man. The ornamentation of the long axis was carefully determined by his (the author's) brother and himself, and it was found to coincide accurately with that at Stonehenge, and the impression left upon their mind was that, in the earthwork, they probably had one of the earliest temples erected to the sun. Mr. Hubbard proceeded to deal with Scorhill Circle, Fenworthy Circle, the Campstone Circle, and the tall monoliths standing on Dartmoor, and said that these circles and campstones doubtless had a vital interest and a vital meaning to neolithic men who erected them. It was possible to speculate as to their significance, but in order to do so with some probability of accuracy it would be necessary to argue from the known to the unknown. The circles of stones were sometimes found in connexion with stone alignments or avenues of stones, as at Assecombe; sometimes the alignments terminated with a great member; but until these had all been properly mapped out, the first step to the definite solution of their mysteries had not been taken. In Stonehenge they found the culminating structure, and here some authoritative statements might be made. After the full significance of Stonehenge had been realised, it became possible to speculate with more assurance about these earlier structures on Dartmoor and Maumbury Rings. It was obvious that there was some definite intention in the design of Stonehenge, and, thanks to the investigations of Mr. Gowland and Sir Norman Lockyer, that intention had been made clear, and a flood of light had been thrown upon the religion of neolithic man. Mr. Gowland had shown that, by standing in the middle of the horseshoe curve at a point once marked by the aperture between the two piers of the central and greatest trilithon, and looking in the direction of the hele stone, the sun would be seen to rise approximately over the summit of that monolith on a midsummer day. From this and other evidence there could be no doubt but that Stonehenge was a sun temple. When his brother and he looked upon Maumbury Rings and speculated upon it they felt that, if it were a sun temple, it was of far greater antiquity than Stonehenge, but it lacked a confirmatory piece of evidence. It should have had a great stone at its entrance analogous to the "hele" stone of Stonehenge. They searched for that stone, and failed to find it, but later they found, in John Hutchins' book on the antiquities of Dorset that "Roger Gale derived the name of Maumbury from 'maen,' a great stone which lay at the entrance when he saw it 1719." By another authority they had found it stated that a large stone formerly existed at the entrance, but as this

was found to be an obstacle to the cultivation of the land, a hole was dug and the stone was deposited in it. If at Stonehenge they found circles and a stone having an obvious solar significance, and they found elsewhere circles and stones apparently bearing no such significance, then the question arose as to what change took place in the evolution of the faith of neolithic man which resulted in his becoming a sun worshipper? Here, in England, as in all the world over, the evidence showed that the earliest forms of faith were Phallic. The sun, the giver of life, became no doubt symbolical of the earlier forms of faith, and the symbols of the organs of reproductions which had previously been objects of veneration were still used after prehistoric man had emerged from a state of Phallicism to that of sun worship. In this solution might be seen the obvious answer to the previous question.

THE HISTORY OF SYMMETRY IN ART.

FROM a circular which has reached us from the Landesgewerbe Museum of Stuttgart it appears that the Central Board of Trade and Commerce in that city propose to hold an exhibition which is to illustrate the progress of the perception of symmetry in art and handicraft. In the words of the circular (as here translated) the Board is planning for the autumn of this year a great and special exhibition, at which it is proposed to trace for the first time the history of an æsthetic principle, viz., the question of symmetry and balance in arts and handicrafts in every direction; to produce examples and counter-examples from all countries and ages, and bring them under discussion; to point out the physiological hypotheses on which they rest, as well as their types and counterparts in nature and in the practice of art. The object, we are told, in view is a double one, viz., theoretic and practical.

"On the one hand, it will be possible to study this important question in the light of the past and of the present; to consider how the conservative and revolutionary schools have dealt with this question of symmetry, or have disregarded it; while on the other hand our modern art-workers and handicraftsmen, who to some extent believe themselves bound to uncompromising symmetry, have been delivered from a chain and have been stimulated to freer creations.

All museums, artists, and art-lovers are hereby invited to co-operate. All works of high art, as well as works from all areas without respect to date or place of origin will be welcomed in so long as they display in a characteristic manner either a scrupulous adherence to axial or central symmetry, or a sovereign disregard of these static requirements. Even counter-examples, in which the obvious laws of equilibrium have been flagrantly transgressed, will be of interest."

We should certainly be rather curious to see the result of this interesting attempt *rerum cognoscere causas*.

THE SOCIETY OF ARTS.

ON Monday evening Mr. George W. Eve gave the first of three lectures on "Heraldry in Relation to the Applied Arts." He first expressed the wish for a more sympathetic and broader view on the part of both artist and public, though he feared that good heraldry could not come into general use so long as the present craze for cheapness continued. A knowledge of how and why certain things were done in the past would do much to prevent many of the serious mistakes made by craftsmen through their careless interpretation of even the simplest rules and principles.

The practice of heraldry, which probably began in early times with the use of badges, became important in the XIIth century when the closing of head armour made necessary some clear means of distinction. First used in fighting only its symbolism was simple and spontaneous, but in later and degenerate days, when it became a vehicle for the exploitation of family, civil, and religious pride, there arose that desire for mystery and complication which caused the almost complete decay of the art.

The lecturer then described the development of the shield, from the long, narrow Norman type, through the later forms suitable for serious work on horseback, to the small and graceful tilting shield of Tudor times. As examples of the practical basis of heraldry, the strengthening metal bars of the early wood-and-leather shield were instanced as determining the general form of the ordinaries, while later, the irregular outline developed by the use of the tilting lance in tournaments gave rise to the decorative scrolled forms of the XVIIth century. The great increase of effect gained by retaining the curved surface of the true shield should be remembered when dealing with modern carved work; while important, both from the heraldic and artistic point of view, was the question of raising or incising the charges. He then emphasised the importance of simplicity and unmistakable clearness of form, no system of proportion being necessary if this was kept in view.

Among animals, the lion, through having been the most frequently used in all periods, was of great value in any critical study of development, but, owing to the number of definite poses caused by this constant appearance, care must be taken, when designing, to avoid apparently slight alterations, as of the position of limbs or head, since these might quite alter the heraldic action. In treating animals vigour of action was the first essential, and this might often be attained by setting out skeleton lines before filling in detail.

Mr. Eve then summed up the qualities which make for a good treatment of heraldry as follows: Suitable shape of shield, proportion and clear definition, good distribution, strong characterisation, and utmost vigour.

The lecture was illustrated by a number of lantern slides.

THE LONDON TRIBUNAL OF APPEAL:

CRYSTAL PALACE PARADE.

REFERRING to the appeal heard by the Tribunal on the 1st inst., and reported in the *Builder* of the 5th inst., and at which the Tribunal reserved their decision, the Tribunal have now made an order by which they allow the appeal, on the ground that the certificate of the Superintending Architect, dated March 24, 1906, affects the exercise by the appellants, the South-Eastern and Chatham Railway Companies' Managing Committee and the London, Chatham, and Dover Railway Company, of the powers conferred upon them by the special Acts of Parliament for railway purposes produced to the Tribunal, and, further, they make no order as to costs.

FERRO-CONCRETE.

A JOINT meeting of the Discussion Section of the Architectural Association of the Junior Institution of Engineers was held on Wednesday, at 18, Tufton-street, when the discussion on Mr. S. Bylander's paper on "Ferro-concrete" (reported in the *Builder* of April 21) was continued. Mr. Wonnacott presided.

Mr. S. Bylander gave a brief *résumé* of his paper, and added that, with regard to columns, the bearing capacity was increased three or four times if they were hooped. As to the testing power of ferro-concrete he thought that Portland cement was a better protection of steel than paint, and therefore they need not have much fear of the steel rusting. He would suggest that they should try and agree upon a method of calculation that would be recognised as sufficiently accurate for ordinary practice, and further a standard of materials as well as construction.

Mr. J. H. Pearson said that the author in his paper did not claim that ferro-concrete was the right material for all constructions, and emphasised the fact that each kind of material should be used to its greatest advantage—the total cost of the structure, its safety, and its duration to be considered. They were warned that ferro-concrete work was dangerous if not carried out well, and that to guard against failure a large factor of safety was employed. Architects therefore would be chary about using it unless there was some special advantage. It was all very well to know how to use it, but it was still more advantageous to know when to use it, and that was the first thing to know from the architect's point of view. This, no doubt, was largely a question of cost. Mr. Pearson proceeded to sketch a plan of a site, and asked Mr. Bylander if he could give some idea of the difference in cost in the erection of a stated building on the site in steel-work and ferro-concrete, particularly with regard to flooring.

The Chairman said that Mr. Adams Hunter, who was unable to be present, had sent some notes as a guide to the discussion. Mr. Hunter pointed out that notwithstanding the extensive use of ferro-concrete it was still regarded as an experimental material, and must be tested by the standard of experience. They were being constantly told that by the use of steel imbedded in cement concrete the steel was sufficiently protected as to render it imperishable, and that the cost of maintenance was reduced to a minimum. Most elaborate formulæ had been devised to determine the stresses of strength of ferro-concrete structures, which appalled one by their elaboration and detail. The author was correct in stating that a large factor of safety was necessary to cover unknown stresses. French engineers had lately conducted experiments in testing bridges to determine the actual stress developed in a member, and found that in few cases did the actual stress agree with that calculated. Some of the differences amounted to from 100 to 300 per cent., and if these differences existed in steel bridges it was natural to assume that there were some differences in the actual from the calculated stresses in ferro-concrete structures. Concrete was a less uniform material than steel, and anyone who had seen iron cramps from old buildings knew how they were corroded, and how in some cases they had caused the opening of the joints by their swelling due to corrosion. In most cases these cramps would be bedded in lime mortar. In general the determination of stresses was based upon certain relations existing between the moduli of elasticity of the steel and the concrete, and this was a variable proportion, depending so much upon the quality of the cement, the age of the concrete, the care in mixing the ingredients, and so on. The expansion of cement in setting set up initial stresses in the steel reinforcing rods, and there were also the stresses due to the slight differences in the thermal expansion of the two materials. It was calculated that steel, amounting to 0·8 per cent. of the sectional area of the beams was required for resisting these stresses alone. M. Considère, whose authority on ferro-concrete was undisputed, assumed that the concrete took up some of the tensile stresses even beyond the elastic limit of the concrete, but the experiments made by Professor Turneaure, of Pindue University, U.S.A., clearly demonstrated that the concrete would take its share of the tensile stresses up to its elastic limit, after which the steel reinforcement must take the whole of the tensile stresses. Hair cracks were a source of weakness, as they would allow moisture to get in and corrode the bars, and the ferro-concrete piles at Southampton jetty showed the rust through the concrete. It was very important to remove all mill scale from the rods before using them, and the simplest way was to allow them to rust. It was not necessary that the rods should be free from rust when they were embedded in cement of first-class quality, as the chemical action of the Portland cement on the rust formed a new compound, and arrested further corrosion. Round rolled bars were more suitable for reinforcement than expanded metal. The most suitable use of ferro-concrete seemed to be in floor systems for buildings, the main columns and girders being of steel, and the secondary girders and floor slabs of ferro-concrete. Its use in foundations did not seem advisable, as it had not yet had the practical test of age. A foundation was covered up, and inspection was impossible, and any failure involved great cost to remedy. It was difficult to give comparative costs of ferro-concrete and other similar materials and similar structures, as local conditions affected prices to a large extent. There was not much difference in cost between a well-designed ferro-concrete building and a similar building of steel-frame construction with brick walls and fire-proof floors.

Mr. Rugg said he saw a building about three months ago being erected at the Royal Oak by the Great Western Railway. It was being constructed on the Hennebique system, and the remarkable fact was that, owing to the London Building Act, they had to construct the walls about 20 in. thick at the bottom, which was a sheer waste of money. He thought they ought to pass some resolution asking that Parliament should look into

the Act. With regard to ferro-concrete, he thought the whole question depended on whether the iron was going to rust in the concrete. He believed that Mr. Hennebique had constructed these ferro-concrete building in France for the last twenty years, while in America they had been using the material for five years. In England, however, they were frightened of doing anything, and asked if the iron was going to rust and if the adhesion was strong enough. He believed it was granted now on the Continent and in the States that no trouble had been experienced as to rust. A good deal was to be said about adhesion, but there were a number of bars now on the market which provided for a mechanical bond between concrete and steel. He would like to know the minimum distance to the edge of concrete for reinforcement. It was said that round bars were preferable to expanded metal, but they did not get so many cracks in expanded metal as with round bars.

Mr. D. Forster said he would like to emphasise what Mr. Bylander had said as to the necessity for an accurate and sufficient quantity of drawings. His experience of carrying out actual building work on the site made him feel very strongly that sufficient and proper drawings were required, no matter if it was a ferro-concrete or any other kind of building. It was known that steel exposed to air would degenerate, and he would like to know if it would degenerate when embedded in concrete. As to the thickness of walls, the prevention of fire was one reason for keeping them thick. He would like to know something about the materials in the composition of the concrete, for he knew that serious trouble had arisen from the expansion of concrete. Particularly he would like to know if coke breeze was a reliable material to use.

Mr. R. Marshall remarked that, with regard to the question of the corrosion of iron and steel work embedded in concrete, that was not positively settled. Mention had been made of Southampton jetty, but, on the other hand, he believed it was the fact that in many cases where old stanchion work was pulled down the base blades had been found in an almost perfect state of preservation. In the case of high buildings and buildings required for carrying great weight, the air cracks which had been alluded to were of great importance. Granted that it was impossible to guarantee that ferro-concrete work should be air-tight, might it not be advisable to treat the structure with a preservative compound. In the case of a water-tower particularly they might treat it with a wash of preservative paint.

Mr. P. Waldram added to his remarks made at the previous meeting, and pointed out that Hennebique's formulæ, assuming that the compression on concrete was distributed equally, could not be a correct assumption. Before any responsible architect or engineer adopted a particular system he ought to be in a position to calculate it himself, and he thought the general principles could be so calculated. The question which mostly troubled people was that of shearing, but if the shear was considered simply as the inner link between vertical forces coming on the beam and the horizontal tension by which they resisted these forces, the subject was absolutely simple. A ferro-concrete floor should be solid, or, in other words, the aggregate should be carefully ascertained before mixing, and enough sand must be put in to fill up the voids in the large aggregate, and then the lime would distribute itself through the sand, and they would get a solid concrete. Ferro-concrete had been used in foundations for many years, and no failure had resulted so far.

Mr. J. E. Conzelman thought that an agreement of formulæ and a uniformity as to the factor of safety was greatly required. The question of the distribution of shear had puzzled a great many people, and had not been settled yet. Where they had horizontal shear they had also vertical shear. The durability of concrete had been settled by the engineers of the United States and France. Steel was practically protected for all time as long as there was a coating of cement around it.

Mr. Eade believed there was such a diversity of opinion with regard to formulæ that it would be necessary in the case of a very large work to have some full-sized beams made and tested on the site. It was true this would add to the cost of the building, but there seemed to be a large variation between the calculated strength of a beam and the actual strength, and it would be well to make beams of the actual materials to be employed and test them.

Mr. Keevil observed that the great advantages of ferro-concrete was its fireproofness when the rods were properly embedded and the increased floor space it gave for a certain site. He also thought the ferro-concrete lent itself very easily to architectural beauty, and, in addition, speaking more particularly of places abroad, the materials were very easily obtained. As to formulæ, it was pretty well understood on the Continent and in America that a concrete of one in twenty-four was strong enough to take shearing up to 50 per cent. for a load up to 50 lb. per square inch for a load of vibration, and up to 80 lb. per square inch for a steady load.

Mr. Tennant said that mention had been made to the deterioration of iron cramps taken out of concrete walls, but in all probability, when these were put in, no special precautions were taken to preserve them, whereas, in ferro-concrete construction, the first consideration would be given to the preservation of the reinforcement from the access of air or water. They heard at the last meeting a great deal about the position of the neutral axis, but it could not be too clearly insisted upon that the position of the neutral axis had nothing whatever to do with the ultimate strength of the material, but it had very much to do with the elastic resistance of the material, which was quite another thing, for its strength. In ferro-concrete there was a great difference in the elasticity of the materials employed, and therefore they got a neutral axis shifted out of the geometrical position. He could not help thinking that the recent earthquake at San Francisco and the Baltimore fire ought to give experience as to the behaviour of ferro-concrete which would be distinctly profitable.

The Chairman said that, with regard to getting some finish on ferro-concrete by giving it a coating of plaster of Paris, he imagined that, in a few years, that would be an expensive building to maintain. As regarded the possibilities from the architectural point of view, that would be dealt with at the forthcoming Congress, but he thought the only means of treatment which could be suggested was to look on ferro-concrete as a plastic material, and, therefore, from the architect's point of view, they could be hopeful. It could be treated with a few strings, or mouldings, or panels, or something of the kind. There was also a great possibility of colour decoration of a permanent nature which could easily be employed, and he thought they would see examples in Persia, China, and Japan of permanent coloured decorative material applied externally.

Mr. Bylander, in reply, said the question of the cost of the building shown by Mr. Pearson would be a matter for the estimator. He thought 14 in. was the most practical thickness for walls. He would not advocate 4-in. walls on account of the dampness. As regarded the distance of the rods for the outer surface of the concrete, he should say 1½ in. if complete fire protection was required; but it must be remembered that the material used for a ferro-concrete structure was of much better quality than for ordinary steel-frame buildings. If coke breeze was used the adhesion between the steel and the material was not so great, and, further, it was porous. So far as fireproof was concerned, clinker was the best material, but if stone or gravel was crushed to a sufficiently small size the possibilities of cracking in case of fire was minimised. Water tanks were often treated with a wash of paint, but the most important thing was that the concrete should be made rich, and that the steel was properly embedded, and that there should be no voids.

MEMORIAL TO WHITEFIELD.—On the afternoon of Sunday, May 13, a marble bust of George Whitefield was unveiled in the Whitefield Memorial Building, the central hall of the London Congregational Union, Tottenham Court-road. The bust has been sculptured by Mr. H. A. Pegram.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

I.—ALL SAINTS' CHURCH, TOOTING.

THE first summer visit took place on Saturday, 12th inst., at the Church of All Saints, Tooting Graveney, an important modern ecclesiastical work in the south of London. The church, which is erected from funds bequeathed by a lady, is the central object in a group of buildings, the remainder of which comprises a vicarage and a large parish hall.

The architect (Mr. Temple Moore) was unavoidably absent from the visit, but was represented by a member of his office staff and the general foreman.

The church has a seating capacity of 1,024 persons, distributed in a lady chapel at the south end, chancel with aisles, transepts, nave with aisles, and narthex, the latter at the north end. It will thus be seen that the axis is practically north and south instead of the usual orientation.

A large square tower rises above the east transept, and will eventually contain a full peal of bells. Vestries adjoin the west transept, and the passage connecting them communicates with the vicarage. In this transept the organ will be placed. The internal length is about 168 ft; the width of nave and chancel is 25 ft., and the aisles each about 22 ft. The height is of generous proportion, so that an air of spaciousness characterises the interior.

There is no chancel arch, or, indeed, anything to mark the choir other than the steps and screen, so that the main arcades are uniform and continuous from end to end of the church.

Although the work was, as yet, two months from date of completion enough existed to show that dignity was achieved in the design, and that the plan was well adapted to the purposes of a large congregation.

Various stones are employed. In the interior the wall surfaces are plastered, but the material at and above the main arcade is chiefly Bath stone. Forest of Dean is used in shafts and piers and also in steps and flooring, and the interesting natural variation in tones gives a very satisfying effect. Another and kindred material, Quarella, is used in the large bases of the piers. The exterior mainly consists of yellow stock brick-facing, and the sparingly-used stone is Ketton in the usual dressings, and Forest of Dean for bases and weatherings.

Heating is provided by means of hot-water pipes at window-sill level, the pipes being hidden in the projecting cornice of an oak-panelled dado. Pipes are continued up to the clearstory, passing round the whole interior of the church.

The nave and chancel have a vaulted roof of a stone character entirely constructed in wood and painted. Stone springers are introduced to start the ribs of the vaulting. A XIIIth century English Gothic influence is the motif in the architecture.

Messrs. Sherwin & Son, of Boston, have carried out the entire works, including the vicarage and hall, both of which are very tasteful stock-brick buildings.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens, S.W., Alderman Spicer, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to sanction the borrowing of 7,800*l.* by Deptford Borough Council; and it was agreed to lend Finsbury Borough Council 6,563*l.* for paving works; and Lewisham Borough Council 1,845*l.* for constructing a public convenience.

Reconstruction of Tramways from Islington to Highbury—Supply of Electric Power.—The Highways Committee recommended, and it was agreed:—

"That the agreement entered into with the County of London Electric Supply Company, Ltd., in pursuance of the resolution of August 1, 1905, be extended so as to include a supply, at the same rate, of electric power for working the tramways from the Angel, Islington, and Upper-street, to Highbury (N.L.R.) Station, and to provide that the company shall give the Council facilities to erect switch panels at the Old-street generating station, and shall supply the cable-ducts necessary from the station to the Angel, Islington, and a telephone cable for coupling up to the Council's Great Queen-street sub-station."

was found to be an obstacle to the cultivation of the land, a hole was dug and the stone was deposited in it. If at Stonehenge they found circles and a stone having an obvious solar significance, and they found elsewhere circles and stones apparently bearing no such significance, then the question arose as to what change took place in the evolution of the faith of neolithic man which resulted in his becoming a sun worshipper? Here, in England, as in all the world over, the evidence showed that the earliest forms of faith were Phallic. The sun, the giver of life, became no doubt symbolical of the earlier forms of faith, and the symbols of the organs of reproductions which had previously been objects of veneration were still used after prehistoric man had emerged from a state of Phallicism to that of sun worship. In this solution might be seen the obvious answer to the previous question.

THE HISTORY OF SYMMETRY IN ART.

FROM a circular which has reached us from the Landesgewerbe Museum of Stuttgart it appears that the Central Board of Trade and Commerce in that city propose to hold an exhibition which is to illustrate the progress of the perception of symmetry in art and handicraft. In the words of the circular (as here translated) the Board is planning for the autumn of this year a great and special exhibition, at which it is proposed to trace for the first time the history of an æsthetic principle, viz., the question of symmetry and balance in arts and handicrafts in every direction; to produce examples and counter-examples from all countries and ages, and bring them under discussion; to point out the physiological hypotheses on which they rest, as well as their types and counterparts in nature and in the practice of art. The object, we are told, in view is a double one, viz., theoretic and practical.

"On the one hand, it will be possible to study this important question in the light of the past and of the present; to consider how the conservative and revolutionary schools have dealt with this question of symmetry, or have disregarded it; while on the other hand our modern art-workers and handicraftsmen, who to some extent believe themselves bound to uncompromising symmetry, have been delivered from a chain and have been stimulated to freer creations.

All museums, artists, and art-lovers are hereby invited to co-operate. All works of high art, as well as works from all areas without respect to date or place of origin will be welcomed in so long as they display in a characteristic manner either a scrupulous adherence to axial or central symmetry, or a sovereign disregard of these static requirements. Even counter-examples, in which the obvious laws of equilibrium have been flagrantly transgressed, will be of interest."

We should certainly be rather curious to see the result of this interesting attempt *rerum cognoscere causas*.

THE SOCIETY OF ARTS.

ON Monday evening Mr. George W. Eve gave the first of three lectures on "Heraldry in Relation to the Applied Arts." He first expressed the wish for a more sympathetic and broader view on the part of both artist and public, though he feared that good heraldry could not come into general use so long as the present craze for cheapness continued. A knowledge of how and why certain things were done in the past would do much to prevent many of the serious mistakes made by craftsmen through their careless interpretation of even the simplest rules and principles.

The practice of heraldry, which probably began in early times with the use of badges, became important in the XIIth century when the closing of head armour made necessary some clear means of distinction. First used in fighting only its symbolism was simple and spontaneous, but in later and degenerate days, when it became a vehicle for the exploitation of family, civil, and religious pride, there arose that desire for mystery and complication which caused the almost complete decay of the art.

The lecturer then described the development of the shield, from the long, narrow Norman type, through the later forms suitable for serious work on horseback, to the small and graceful tilting shield of Tudor times. As examples of the practical basis of heraldry, the strengthening metal bars of the early wood-and-leather shield were instanced as determining the general form of the ordinaries, while later, the irregular outline developed by the use of the tilting lance in tournaments gave rise to the decorative scrolled forms of the XVIIth century. The great increase of effect gained by retaining the curved surface of the true shield should be remembered when dealing with modern carved work; while important, both from the heraldic and artistic point of view, was the question of raising or incising the charges. He then emphasised the importance of simplicity and unmistakable clearness of form, no system of proportion being necessary if this was kept in view.

Among animals, the lion, through having been the most frequently used in all periods, was of great value in any critical study of development, but, owing to the number of definite poses caused by this constant appearance, care must be taken, when designing, to avoid apparently slight alterations, as of the position of limbs or head, since these might quite alter the heraldic action. In treating animals vigour of action was the first essential, and this might often be attained by setting out skeleton lines before filling in detail.

Mr. Eve then summed up the qualities which make for a good treatment of heraldry as follows: Suitable shape of shield, proportion and clear definition, good distribution, strong characterisation, and utmost vigour.

The lecture was illustrated by a number of lantern slides.

THE LONDON TRIBUNAL OF APPEAL:

CRYSTAL PALACE PARADE.

REFERRING to the appeal heard by the Tribunal on the 1st inst., and reported in the *Builder* of the 5th inst., and at which the Tribunal reserved their decision, the Tribunal have now made an order by which they allow the appeal, on the ground that the certificate of the Superintending Architect, dated March 24, 1906, affects the exercise by the appellants, the South-Eastern and Chatham Railway Companies' Managing Committee and the London, Chatham, and Dover Railway Company, of the powers conferred upon them by the special Acts of Parliament for railway purposes produced to the Tribunal, and, further, they make no order as to costs.

FERRO-CONCRETE.

A JOINT meeting of the Discussion Section of the Architectural Association of the Junior Institution of Engineers was held on Wednesday, at 18, Tufton-street, when the discussion on Mr. S. Bylander's paper on "Ferro-concrete" (reported in the *Builder* of April 21) was continued. Mr. Wonnacott presided.

Mr. S. Bylander gave a brief *résumé* of his paper, and added that, with regard to columns, the bearing capacity was increased three or four times if they were hooped. As to the testing power of ferro-concrete he thought that Portland cement was a better protection of steel than paint, and therefore they need not have much fear of the steel rusting. He would suggest that they should try and agree upon a method of calculation that would be recognised as sufficiently accurate for ordinary practice, and further a standard of materials as well as construction.

Mr. J. H. Pearson said that the author in his paper did not claim that ferro-concrete was the right material for all constructions, and emphasised the fact that each kind of material should be used to its greatest advantage—the total cost of the structure, its safety, and its duration to be considered. They were warned that ferro-concrete work was dangerous if not carried out well, and that to guard against failure a large factor of safety was employed. Architects therefore would be chary about using it unless there was some special advantage. It was all very well to know how to use it, but it was still more advantageous to know when to use it, and that was the first thing to know from the architect's point of view. This, no doubt, was largely a question of cost. Mr. Pearson proceeded to sketch a plan of a site, and asked Mr. Bylander if he could give some idea of the difference in cost in the erection of a stated building on the site in steel-work and ferro-concrete, particularly with regard to flooring.

The Chairman said that Mr. Adams Hunter, who was unable to be present, had sent some notes as a guide to the discussion. Mr. Hunter pointed out that notwithstanding the extensive use of ferro-concrete it was still regarded as an experimental material, and must be tested by the standard of experience. They were being constantly told that by the use of steel imbedded in cement concrete the steel was sufficiently protected as to render it imperishable, and that the cost of maintenance was reduced to a minimum. Most elaborate formulæ had been devised to determine the stresses of strength of ferro-concrete structures, which appalled one by their elaboration and detail. The author was correct in stating that a large factor of safety was necessary to cover unknown stresses. French engineers had lately conducted experiments in testing bridges to determine the actual stress developed in a member, and found that in few cases did the actual stress agree with that calculated. Some of the differences amounted to from 100 to 300 per cent., and if these differences existed in steel bridges it was natural to assume that there were some differences in the actual from the calculated stresses in ferro-concrete structures. Concrete was a less uniform material than steel, and anyone who had seen iron cramps from old buildings knew how they were corroded, and how in some cases they had caused the opening of the joints by their swelling due to corrosion. In most cases these cramps would be bedded in lime mortar. In general the determination of stresses was based upon certain relations existing between the moduli of elasticity of the steel and the concrete, and this was a variable proportion, depending so much upon the quality of the cement, the age of the concrete, the care in mixing the ingredients, and so on. The expansion of cement in setting set up initial stresses in the steel reinforcing rods, and there were also the stresses due to the slight differences in the thermal expansion of the two materials. It was calculated that steel, amounting to 0·8 per cent. of the sectional area of the beams was required for resisting these stresses alone. M. Considère, whose authority on ferro-concrete was undisputed, assumed that the concrete took up some of the tensile stresses even beyond the elastic limit of the concrete, but the experiments made by Professor Turneaure, of Pindue University, U.S.A., clearly demonstrated that the concrete would take its share of the tensile stresses up to its elastic limit, after which the steel reinforcement must take the whole of the tensile stresses. Hair cracks were a source of weakness, as they would allow moisture to get in and corrode the bars, and the ferro-concrete piles at Southampton jetty showed the rust through the concrete. It was very important to remove all mill scale from the rods before using them, and the simplest way was to allow them to rust. It was not necessary that the rods should be free from rust when they were embedded in cement of first-class quality, as the chemical action of the Portland cement on the rust formed a new compound, and arrested further corrosion. Round rolled bars were more suitable for reinforcement than expanded metal. The most suitable use of ferro-concrete seemed to be in floor systems for buildings, the main columns and girders being of steel, and the secondary girders and floor slabs of ferro-concrete. Its use in foundations did not seem advisable, as it had not yet had the practical test of age. A foundation was covered up, and inspection was impossible, and any failure involved great cost to remedy. It was difficult to give comparative costs of ferro-concrete and other similar materials and similar structures, as local conditions affected prices to a large extent. There was not much difference in cost between a well-designed ferro-concrete building and a similar building of steel-frame construction with brick walls and fire-proof floors.

Mr. Rugg said he saw a building about three months ago being erected at the Royal Oak by the Great Western Railway. It was being constructed on the Hennebique system, and the remarkable fact was that, owing to the London Building Act, they had to construct the walls about 20 in. thick at the bottom, which was a sheer waste of money. He thought they ought to pass some resolution asking that Parliament should look into

the Act. With regard to ferro-concrete, he thought the whole question depended on whether the iron was going to rust in the concrete. He believed that Mr. Hennebique had constructed these ferro-concrete building in France for the last twenty years, while in America they had been using the material for five years. In England, however, they were frightened of doing anything, and asked if the iron was going to rust and if the adhesion was strong enough. He believed it was granted now on the Continent and in the States that no trouble had been experienced as to rust. A good deal was to be said about adhesion, but there were a number of bars now on the market which provided for a mechanical bond between concrete and steel. He would like to know the minimum distance to the edge of concrete for reinforcement. It was said that round bars were preferable to expanded metal, but they did not get so many cracks in expanded metal as with round bars.

Mr. D. Forster said he would like to emphasise what Mr. Bylander had said as to the necessity for an accurate and sufficient quantity of drawings. His experience of carrying out actual building work on the site made him feel very strongly that sufficient and proper drawings were required, no matter if it was a ferro-concrete or any other kind of building. It was known that steel exposed to air would degenerate, and he would like to know if it would degenerate when embedded in concrete. As to the thickness of walls, the prevention of fire was one reason for keeping them thick. He would like to know something about the materials in the composition of the concrete, for he knew that serious trouble had arisen from the expansion of concrete. Particularly he would like to know if coke breeze was a reliable material to use.

Mr. R. Marshall remarked that, with regard to the question of the corrosion of iron and steel work embedded in concrete, that was not positively settled. Mention had been made of Southampton jetty, but, on the other hand, he believed it was the fact that in many cases where old stanchion work was pulled down the base blades had been found in an almost perfect state of preservation. In the case of high buildings and buildings required for carrying great weight, the air cracks which had been alluded to were of great importance. Granted that it was impossible to guarantee that ferro-concrete work should be air-tight, might it not be advisable to treat the structure with a preservative compound. In the case of a water-tower particularly they might treat it with a wash of preservative paint.

Mr. P. Waldram added to his remarks made at the previous meeting, and pointed out that Hennebique's formulæ, assuming that the compression on concrete was distributed equally, could not be a correct assumption. Before any responsible architect or engineer adopted a particular system he ought to be in a position to calculate it himself, and he thought the general principles could be so calculated. The question which mostly troubled people was that of shearing, but if the shear was considered simply as the inner link between vertical forces coming on the beam and the horizontal tension by which they resisted these forces, the subject was absolutely simple. A ferro-concrete floor should be solid, or, in other words, the aggregate should be carefully ascertained before mixing, and enough sand must be put in to fill up the voids in the large aggregate, and then the lime would distribute itself through the sand, and they would get a solid concrete. Ferro-concrete had been used in foundations for many years, and no failure had resulted so far.

Mr. J. E. Conzelman thought that an agreement of formulæ and a uniformity as to the factor of safety was greatly required. The question of the distribution of shear had puzzled a great many people, and had not been settled yet. Where they had horizontal shear they had also vertical shear. The durability of concrete had been settled by the engineers of the United States and France. Steel was practically protected for all time as long as there was a coating of cement around it.

Mr. Eade believed there was such a diversity of opinion with regard to formulæ that it would be necessary in the case of a very large work to have some full-sized beams made and tested on the site. It was true this would add to the cost of the building, but there seemed to be a large variation between the calculated strength of a beam and the actual strength, and it would be well to make beams of the actual materials to be employed and test them.

Mr. Keevil observed that the great advantages of ferro-concrete was its fireproofness when the rods were properly embedded and the increased floor space it gave for a certain site. He also thought the ferro-concrete lent itself very easily to architectural beauty, and, in addition, speaking more particularly of places abroad, the materials were very easily obtained. As to formulæ, it was pretty well understood on the Continent and in America that a concrete of one in twenty-four was strong enough to take shearing up to 50 per cent. for a load up to 50 lb. per square inch for a load of vibration, and up to 80 lb. per square inch for a steady load.

Mr. Tennant said that mention had been made to the deterioration of iron cramps taken out of concrete walls, but in all probability, when these were put in, no special precautions were taken to preserve them, whereas, in ferro-concrete construction, the first consideration would be given to the preservation of the reinforcement from the access of air or water. They heard at the last meeting a great deal about the position of the neutral axis, but it could not be too clearly insisted upon that the position of the neutral axis had nothing whatever to do with the ultimate strength of the material, but it had very much to do with the elastic resistance of the material, which was quite another thing, for its strength. In ferro-concrete there was a great difference in the elasticity of the materials employed, and therefore they got a neutral axis shifted out of the geometrical position. He could not help thinking that the recent earthquake at San Francisco and the Baltimore fire ought to give experience as to the behaviour of ferro-concrete which would be distinctly profitable.

The Chairman said that, with regard to getting some finish on ferro-concrete by giving it a coating of plaster of Paris, he imagined that, in a few years, that would be an expensive building to maintain. As regarded the possibilities from the architectural point of view, that would be dealt with at the forthcoming Congress, but he thought the only means of treatment which could be suggested was to look on ferro-concrete as a plastic material, and, therefore, from the architect's point of view, they could be hopeful. It could be treated with a few strings, or mouldings, or panels, or something of the kind. There was also a great possibility of colour decoration of a permanent nature which could easily be employed, and he thought they would see examples in Persia, China, and Japan of permanent coloured decorative material applied externally.

Mr. Bylander, in reply, said the question of the cost of the building shown by Mr. Pearson would be a matter for the estimator. He thought 14 in. was the most practical thickness for walls. He would not advocate 4-in. walls on account of the dampness. As regarded the distance of the rods for the outer surface of the concrete, he should say 1½ in. if complete fire protection was required; but it must be remembered that the material used for a ferro-concrete structure was of much better quality than for ordinary steel-frame buildings. If coke breeze was used the adhesion between the steel and the material was not so great, and, further, it was porous. So far as fireproof was concerned, clinker was the best material, but if stone or gravel was crushed to a sufficiently small size the possibilities of cracking in case of fire was minimised. Water tanks were often treated with a wash of paint, but the most important thing was that the concrete should be made rich, and that the steel was properly embedded, and that there should be no voids.

MEMORIAL TO WHITEFIELD.—On the afternoon of Sunday, May 13, a marble bust of George Whitefield was unveiled in the Whitefield Memorial Building, the central hall of the London Congregational Union, Tottenham Court-road. The bust has been sculptured by Mr. H. A. Pegram.

THE ARCHITECTURAL ASSOCIATION SUMMER VISITS:

I.—ALL SAINTS' CHURCH, TOOTING.

THE first summer visit took place on Saturday, 12th inst., at the Church of All Saints, Tooting Graveney, an important modern ecclesiastical work in the south of London. The church, which is erected from funds bequeathed by a lady, is the central object in a group of buildings, the remainder of which comprises a vicarage and a large parish hall.

The architect (Mr. Temple Moore) was unavoidably absent from the visit, but was represented by a member of his office staff and the general foreman.

The church has a seating capacity of 1,024 persons, distributed in a lady chapel at the south end, chancel with aisles, transepts, nave with aisles, and narthex, the latter at the north end. It will thus be seen that the axis is practically north and south instead of the usual orientation.

A large square tower rises above the east transept, and will eventually contain a full peal of bells. Vestries adjoin the west transept, and the passage connecting them communicates with the vicarage. In this transept the organ will be placed. The internal length is about 168 ft; the width of nave and chancel is 25 ft., and the aisles each about 22 ft. The height is of generous proportion, so that an air of spaciousness characterises the interior.

There is no chancel arch, or, indeed, anything to mark the choir other than the steps and screen, so that the main arcades are uniform and continuous from end to end of the church.

Although the work was, as yet, two months from date of completion enough existed to show that dignity was achieved in the design, and that the plan was well adapted to the purposes of a large congregation.

Various stones are employed. In the interior the wall surfaces are plastered, but the material at and above the main arcade is chiefly Bath stone. Forest of Dean is used in shafts and piers and also in steps and flooring, and the interesting natural variation in tones gives a very satisfying effect. Another and kindred material, Quarella, is used in the large bases of the piers. The exterior mainly consists of yellow stock brick-facing, and the sparingly-used stone is Ketton in the usual dressings, and Forest of Dean for bases and weatherings.

Heating is provided by means of hot-water pipes at window-sill level, the pipes being hidden in the projecting cornice of an oak-panelled dado. Pipes are continued up to the clearstory, passing round the whole interior of the church.

The nave and chancel have a vaulted roof of a stone character entirely constructed in wood and painted. Stone springers are introduced to start the ribs of the vaulting. A XIIIth century English Gothic influence is the motif in the architecture.

Messrs. Sherwin & Son, of Boston, have carried out the entire works, including the vicarage and hall, both of which are very tasteful stock-brick buildings.

THE LONDON COUNTY COUNCIL.

THE usual weekly meeting of the London County Council was held on Tuesday in the County Hall, Spring-gardens, S.W., Alderman Spicer, Chairman, presiding.

Loans.—On the recommendation of the Finance Committee, it was agreed to sanction the borrowing of 7,800*l.* by Deptford Borough Council; and it was agreed to lend Finsbury Borough Council 6,563*l.* for paving works; and Lewisham Borough Council 1,845*l.* for constructing a public convenience.

Reconstruction of Tramways from Islington to Highbury—Supply of Electric Power.—The Highways Committee recommended, and it was agreed:—

"That the agreement entered into with the County of London Electric Supply Company, Ltd., in pursuance of the resolution of August 1, 1905, be extended so as to include a supply, at the same rate, of electric power for working the tramways from the Angel, Islington, *viâ* Upper-street, to Highbury (N.L.R.) Station, and to provide that the company shall give the Council facilities to erect switch panels at the Old-street generating station, and shall supply the cable-ducts necessary from the station to the Angel, Islington, and a telephone cable for coupling up to the Council's Great Queen-street sub-station."

Norbury Estate — Brickmaking. — The Housing of the Working Classes Committee recommended :—

"(a) That the resolution of May 21, 1901, fixing the minimum rates of pay and the maximum hours of labour to be observed in the making of bricks on the Norbury estate be rescinded so far as it relates to minimum rates of pay.

(b) That the undermentioned rates of pay be fixed as the minimum rates to be observed in the manufacture of bricks on the Norbury estate, viz., digging, 4½d. a cubic yard; soiling, 3d. a thousand bricks; sharing out, 6d. a thousand bricks; setting, 1s. 11d. a thousand bricks; moulding (stocks), 5s. 6d. a thousand bricks; moulding (reds), 8s. a thousand bricks; crowding, 2s. 4d. a thousand bricks; skintling, 3d. a thousand bricks; burning, 1s. 6d. a thousand bricks; drawing, 1s. 4d. a thousand bricks; runs, 1½d. each; day work, 6½d. an hour; engine driver, 8d. an hour."

Mansell-street and Great Prescot-street.— The Improvements Committee recommended :—

"(a) That the supplemental estimate of expenditure on capital account of 3,200*l.*, submitted by the Finance Committee in respect of the widening of Mansell-street and Great Prescot-street, as shown upon the plan of property included in such estimate, be approved.

(b) That expenditure not exceeding 3,200*l.* be sanctioned in respect of the widening of Mansell-street and Great Prescot-street as provided in resolution (a); and that the Improvements Committee be authorised to arrange for the said widening."

The Council adjourned at 7.30 p.m.

APPLICATIONS UNDER THE 1894 BUILDING ACT.

THE London County Council at their meeting on Tuesday dealt with the following applications under the London Building Act, 1894. The names of applicants are given between parentheses :—

Lines of Frontage and Projections.

Deptford.—Five gate piers at the entrances to the South-Eastern Hospital on the western side of Avonley-road, New Cross-road, Deptford (Messrs. T. W. Aldwinckle & Son for the Metropolitan Asylums Board).—Consent.

Woolwich.—Bay windows in front of Nos. 13, 15, 17, and 19, Glenshiel-road, Eltham (Mr. J. J. Bassett for Mr. A. Cameron Corbett).—Consent.

Dulwich.—The retention of porches in front of Nos. 13, 14, 15, 16, 17, and 18, Ruskin-walk, Herne-hill (Mr. R. E. Mayo).—Consent.

Lambeth, North.—The retention of an iron and glass porch in front of No. 40, York-road, Lambeth (Messrs. Ohlson & Sons for Mr. Hitchcock).—Consent.

Norwood.—Re-erection of Landsowne Hall, Canterbury-grove, West Norwood (Mr. W. G. Scott for the Rev. Fuller Gooch).—Consent.

Wandsworth.—Re-erection of buildings on the south-western side of Garratt-lane, Wandsworth, with flank walls abutting on the north-western and south-eastern sides of Rostella-road (Mr. W. Bartholomew for Mr. P. C. Newman and Mr. C. Newman, jun.).—Consent.

Finsbury, Central. †—Buildings on the northern side of Pentonville-road, to abut also upon Winchester-street (Mr. C. E. Pettit for Mr. T. Lilley and Messrs. Lilley & Skinner, Ltd.).—Refused.

Brixton. †—Projecting one-story shops in front of Nos. 5 and 7, Flaxman-road, Loughborough-junction (Messrs. Binsted Brothers).—Refused.

Kennington.—A projecting one-story shop in front of No. 210, South Lambeth-road, Kennington (Mr. F. E. Williams for Mr. J. Hill).—Refused.

Width of Way.

Finsbury, East.—That the application of Messrs. Joseph & Smithem for an extension of the period within which the erection of warehouse buildings on the north side of Great Arthur-street and south side of Bayer-street, Golden-lane, was required to be completed, be granted.—Consent.

Lines of Frontage and Construction.

Rotherhithe.—A deviation from the plans approved for the construction of an iron gangway to connect Hay's Wharf and Wilson's Wharf, over the public right-of-way leading from Battle-bridge-lane to Battle-bridge-stairs, Rotherhithe, so far as relates to an alteration in the position of the gangway (the proprietors of Hay's Wharf).—Consent.

Formation of Streets.

Westminster.—An extension of the time within which the roadway of a proposed street for carriage traffic to lead from Francis-street to Cobourg-row, Westminster, was to have been clearly defined throughout by posts and rails, or so otherwise as the Council should permit, and thrown open to the public as a highway (Messrs. R. B. Grantham & Son).—Consent.

Wandsworth.—Extension of time within which the roadway of a proposed street for carriage traffic to lead from Wimbledon Park-road to Granville-road, on the Wimbledon Park estate, Wandsworth, was to have been clearly defined throughout by posts and rails, or so otherwise as the Council should permit, and thrown open to the public as a highway (Messrs. Glasier & Sons).—Consent.

Adaptation of Ways for Streets and Width of Way.

Newington, West.—The adaptation for carriage traffic of Jerome-place, Hillingdon-street, Walworth, and the erection of buildings at less than the prescribed distance from the centre of the roadway of Jerome-place (Messrs. Gledhill Brothers).—Consent.

Space at Rear.

Whitechapel.—A modification of the provisions of sect. 41 with regard to open spaces about buildings, so far as relates to the proposed erection of a block of dwellings on the western side of Rupert-street, Whitechapel, with an irregular open space at the rear (Mr. R. W. Hobden for Messrs. Hickman, Ltd.).—Consent.

Alteration of Buildings.

Southwark, West.—A bay window on the space at the rear of block "P" of the Peabody-dwellings, Peabody-square, Blackfriars-road and Webber-street, Southwark (Mr. R. Robertson for the Housing of the Working Classes Committee of the Council).—Consent.

The recommendations marked † are contrary to the views of the local authorities.

COURT OF COMMON COUNCIL.

A MEETING of the Court of Common Council was held at the Guildhall on Thursday last week, the Lord Mayor presiding.

Bishopsgate-street. — Mr. Bamberger asked if there was anything to report with regard to the proposed widening of Bishopsgate-street. In reply Sir George Woodman stated that new proposals on this subject would shortly be placed before the London County Council.

Loan Exhibitions.—A report was presented from the Coal and Corn and Finance Committee on the report of the Library Committee as to holding a Loan Exhibition of Pictures in the Art Gallery in the summer of 1907, at a cost of 450*l.*, exclusive of insurance; and recommending that no exhibition be held in the year 1907. Mr. Deputy Baddeley moved that the matter be referred back to the Coal and Corn and Finance Committee for further consideration. Mr. Cloudsley seconded the amendment, and said that the loan exhibitions at the Guildhall Art Gallery were a great attraction to the whole of London. Mr. Deputy Wallace thought that the Corporation could not afford to spend money in such a manner. Mr. Deputy Ellis pointed out that a Bill, promoted by the London County Council, who wished to establish an art gallery, was being opposed by the Corporation. Mr. Rome stated that as a result of several of the exhibitions which had been held substantial sums of money had been returned to the Corporation. Mr. Painter declared that it was a question whether the permanent exhibition did not suffer by having an annual loan exhibition. On a show of hands the amendment was carried, and the subject was referred back to the Committee for further consideration.

Central Markets.—Mr. Brinsley-Harper submitted a report from the Central Markets Committee recommending the covering-in of the space over the railway facing Charterhouse-street, comprising an area of about 14,000 ft. super. between the fish, fruit and vegetable section of the Central General Market and the premises in the occupation of the London Central Markets Cold Storage Company, Ltd., and also the erection thereon of buildings for market and other purposes at a total estimated cost of 16,225*l.* The recommendations were referred to the Coal and Corn and Finance Committee.

Correspondence.

KING'S NORTON AND WREXHAM SCHOOLS COMPETITION.

SIR,—The two competitions for new schools at King's Norton and Wrexham have not yet, we believe, been decided. In view of the fact that the drawings had to go in for the former on February 7 and for the latter on March 21, it does not, we think, display an undue curiosity to inquire publicly through the medium of your columns into this latest example of the mysterious ways of a Borough Council's conscience.

"COMPETITORS."

LIVERPOOL CATHEDRAL.—The contract for the portions of the Liverpool Cathedral which are to be immediately proceeded with has been let to a local firm of builders, Messrs. Morrison & Sons, of Wavertree, near Liverpool, who have already carried out the foundations. The portion to be proceeded with includes the choir up to the crossing, the Lady Chapel, the Chapter House, and the vestries. It is not expected that the choir can be ready for service before ten or twelve years.

Illustrations.

THE ALLIANCE ASSURANCE COMPANY'S BUILDING, ST. JAMES'S-STREET.

THE building is planned round a central court, and consists of a sub-basement, basement, ground, entresol, first and second floors, and two floors in the roof. In the sub-basement are vaults, etc., heating apparatus, and lift machinery. In the basement is a large office for clerks on the south side, and on the north side kitchens, etc., for the post-office.

On the ground floor in the centre of the St. James's-street front is the general entrance, opening out of which on the south side is the general office of the Alliance Assurance Company, a room 66 ft. long, 24 ft. wide, and 22 ft. high. This room is panelled to a height of 13 ft. with Italian walnut panelling, above which is Istrian marble, with bands of Siberian cippolino. The ceiling is of enriched plaster. On the north side of the entrance is the post-office.

The walls of the entrance-hall are lined with marble, the floor is of Portland stone and marble, the ceiling is of enriched plaster, the gates are of wrought-iron. On the entresol, first and second floors, and most of the third floor are bachelors' flats. The fourth floor consists of caretaker's rooms, kitchens, bedrooms for servants, etc.

The building is entirely of Portland stone. The roofs are covered with Westmorland slates. The floors throughout, and also the roof, are of steel and concrete. The partitions on the upper floors are of Aston's asbestos composition.

The whole of the general contract has been carried out by Messrs. Trollope & Sons and Colls & Son; the steelwork by Messrs. Mathew T. Shaw & Co.; the sanitary work, heating, and electric installation by Messrs. Wenham & Waters; the electric lifts by the Otis Elevator Company; and the electric-light fittings by Messrs. Shirley & Co. The architects are Mr. R. Norman Shaw, R.A., and Mr. Ernest Newton. The drawing is exhibited in the Royal Academy.

BUSBRIDGE HALL.

OUR illustration shows the new house that is being built on this well-known estate, near Godalming, for Mr. Percy N. Graham.

Its position has been chosen overlooking a series of lakes, which, with fine trees and lawns surrounding them, are of great natural beauty.

The old house, which stood by the water's edge, with its principal windows facing north, has been pulled down.

The design is simple in character, the south front being broken by three large five-sided bay windows, gables occurring above between the bays.

The forecourt is formed by the billiard-room wing on the west side and the offices to the east. At the one end of the southern terrace is an arcaded loggia. The balustraded terrace takes a lower level on the south-west side, where the hill falls away.

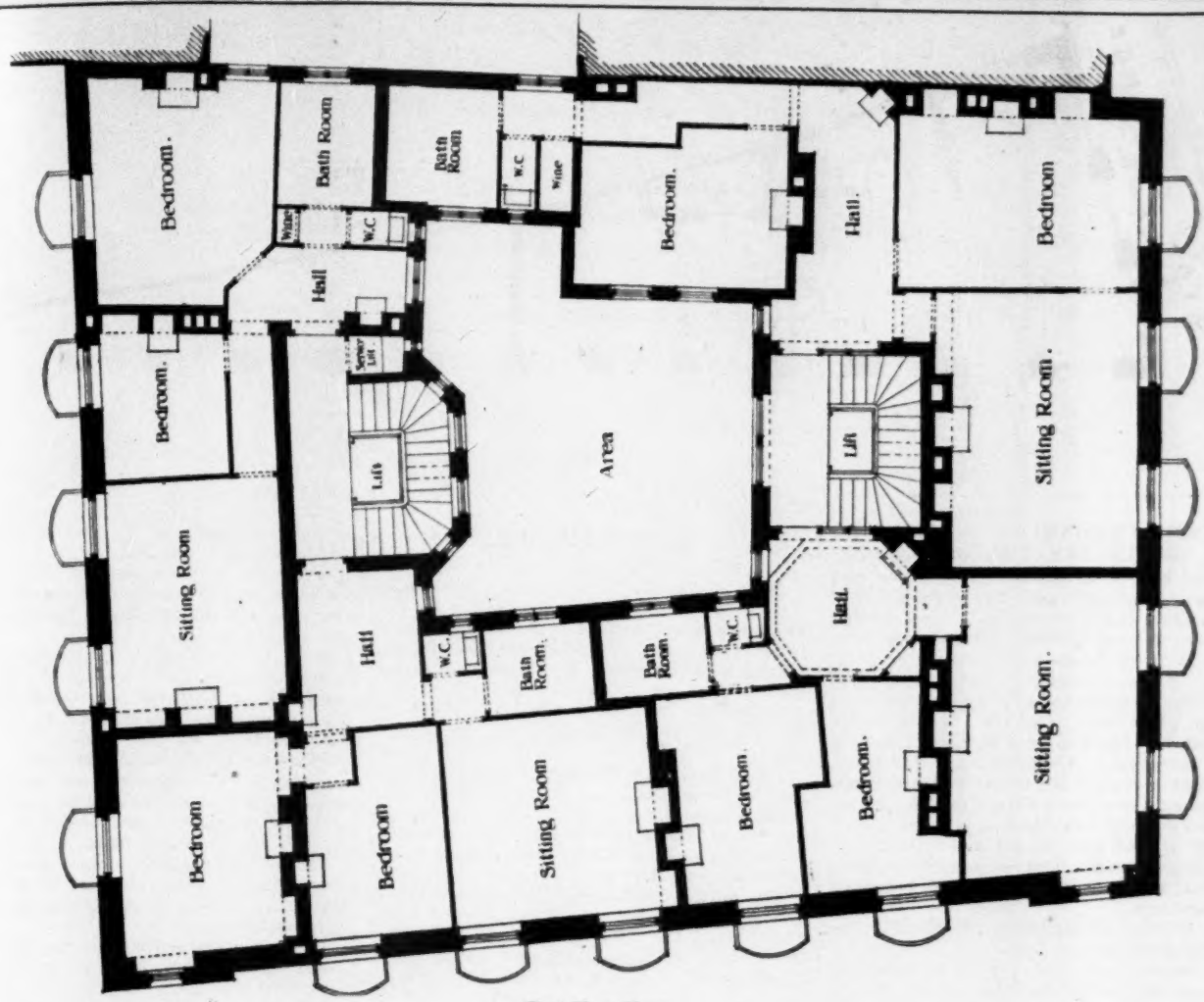
The architects are Messrs. Ernest George & Yeates, of Maddox-street, W., and the contractors Messrs. Norman & Burt, of Burgess Hill, Sussex.

ROYAL EXCHANGE BUILDINGS, CITY.

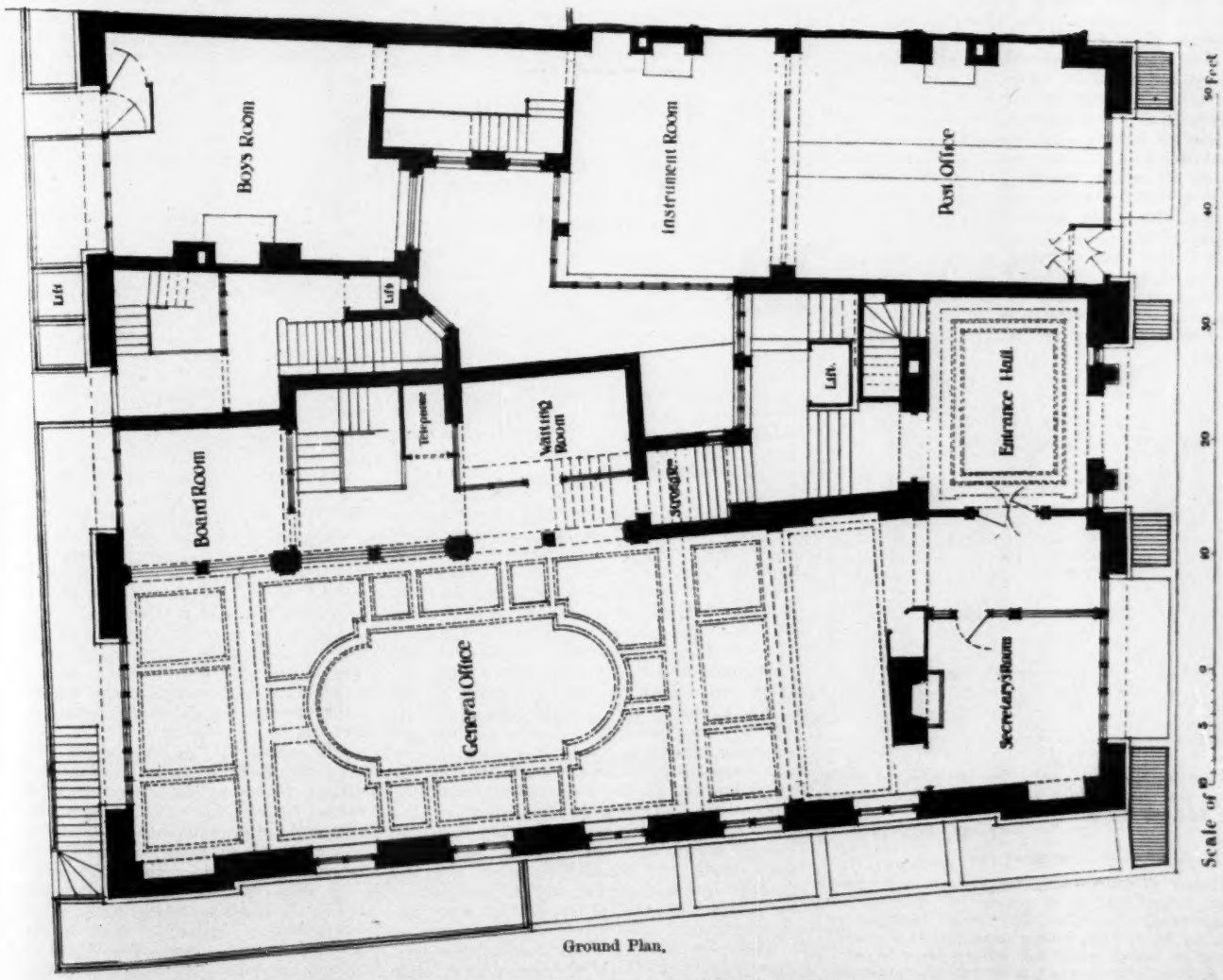
THE existing buildings are being rebuilt at the instance of Magdalen College, Oxford, who are the freeholders, the tenants of the greater part being the Union Assurance Society, while the lease of the south-west portion is taken by Messrs. Hayes, the present occupiers.

The site being shallow the architects have avoided any important breaks or recesses for their effect. The treatment is generally broad and simple, with rusticated arcading for the ground floor, quite a strong shadow being obtained by two deep recesses which form balconies to the upper windows. The front is of Portland stone.

The architects are Messrs. Ernest George & Yeates, who were appointed by Magdalen College.

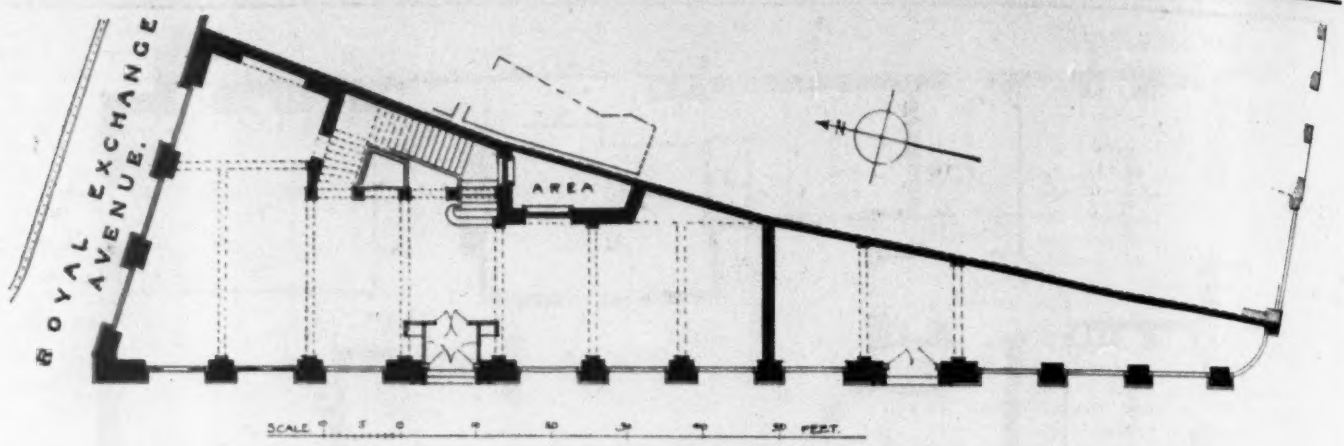


First Floor Plan.



Ground Plan.

Alliance Assurance Offices, St. James's-street. Plans.

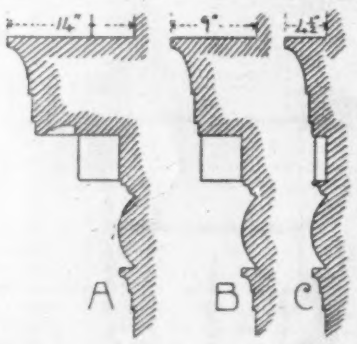


Royal Exchange Buildings. Plan.

OFFICES, CATHERINE-STREET — AS ORIGINALLY PROPOSED.

It had been intended that the narrow and awkward strip of land left between the *Builder* office and York-street, Covent-garden, should have been occupied by premises built by the Bedford Estate and planned for occupation, in the basement, ground, and first floors, by a well-known specialist journal; and the plans were completed and a tender obtained for the building as represented in this illustration. Unfortunately difficulties about rights of light led to the Bedford Office abandoning the scheme as not sufficiently remunerative, and the block has been subsequently carried out in a plainer form and with large ground floor openings for shop windows, which have naturally not improved its appearance.

The unusual arrangement of building the chimney stacks on the outer wall is explained by the second floor plan, for offices to be let, as otherwise it would have been impossible to get a passage past to the private office without cutting off the fireplaces; and as the long side has a south aspect, very large windows were not necessary. As the Building Act thickness of the walls was reducible above the first floor, the reduction was made outside instead of inside, so as to get the lines of the chimney stacks as an exterior feature; an expedient which might often be adopted as a means of making a little point in an exterior elevation; why, in fact, should the reduction always be made inside? The floor space saved is hardly worth counting. In order to stop the stone cornice against the projection of the chimney stacks, which looked much better than carrying it round them, it was, so to speak, flattened out, but so as to mitre with the front cornice; the same cornice mouldings were to be worked for three different projections in fact, as shown at A, B, and C.



The finial balls were to be gilded, like those on the *Builder* office, only they come out dark in the lithograph.

H. H. STATHAM.

ADULT SCHOOL-HALL, COALVILLE. — A new adult school-hall is in course of erection off Bridge-road, Coalville. The main building is 52 ft. by 33 ft. 6 in., with a classroom at the rear, provision being made for entertainments, etc. Mr. A. Boot, of Park-road, is the architect, and the executors of W. Moss the builders. The building will be of red brick and stone.

Competitions.

NEW BUILDINGS, UNIVERSITY COLLEGE OF NORTH WALES, BANGOR.—The following five architects have been selected by the Council of the College to send in competitive designs for the new buildings which it is proposed shortly to erect:—Mr. W. D. Caröe, Mr. J. F. Doyle (Liverpool), Mr. H. T. Hare, Mr. A. Marshall Mackenzie, and Mr. Arnold Mitchell.

THE PALACE OF PEACE.—The competition for the Peace Palace at The Hague has been decided as follows:—First premium, 12,000 florins—M. L. M. Cordonnier, Lille; second, 9,000 florins—M. F. A. Marcel, Paris; third, 7,000 florins—M. Franz Wendt, Charlottenberg; fourth, 5,000 florins—M. Otto Wagner, Vienna. Premiums of 3,000 florins were awarded to Mr. Howard Greenley and Mr. H. S. Olin, of New York, and one of 3,000 florins to M. Franz Schwechten, of Berlin.

BOOK RECEIVED.

DORKING AND LEATHERHEAD. By Joseph E. Morris, B.A. (The Homeland Association. 1s.)

The Student's Column.

SOME MATHEMATICAL METHODS AND USEFUL DATA FOR ARCHITECTS.—XIX.

SLIDE-RULES—GENERAL PRINCIPLE.

BRIEFLY defined, the slide-rule is an instrument by which logarithmic calculations can be performed mechanically.

As long ago as 1620 Edmund Gunter, the colleague of Professor Briggs at Gresham College, made public the logarithmic scales which are still identified with his name. By the aid of a logarithmic scale and a pair of dividers the operations of multiplication and division can be readily performed, as we demonstrated last week in the explanation of Fig. (1).

In its most elementary form the slide-rule comprises two parts—a body graduated so as to correspond with a Gunter's scale, and a similarly graduated slide whose functions correspond in some measure with those of the dividers, but are exercised in a far more convenient and more expeditious manner.

The mechanical principle of a slide-rule can be demonstrated in a very simple manner by taking two decimally graduated scales C and D, placing them side by side, as shown in Fig. (2); next moving C until 0, which we will call the index, is opposite 2 on D, and then comparing the relative positions of the figures marked on the two scales. It will be seen by Fig. 3 that when the index of C is opposite 2 on D, the value of every figure on D is 2 more than that of the contiguous figure on C, and the difference of any two numbers is constant for any adjustment of the scales. If the index of C were set opposite 3 on D, the value of every figure on D would be 3 more than that of the contiguous figure on C; if the index of C were set opposite 4 on D, the value of every figure on D would be 4 more than that of the contiguous figure on C, and so on for the whole length of the scale.

Thus we are enabled to add any two integers, mixed numbers, or fractions within the range of the two scales by following the rule:—

Rule (1).—To add two numbers, set the index of scale C to one of the factors on scale D, and under the other factor on scale C read the sum on scale D.

Conversely, we are enabled to perform subtraction by observing the rule:—

Rule (2).—To subtract one number from another, set the subtrahend on scale C to the minuend on scale D, and under the index of scale C read the difference on scale D.

If we now place the two scales so that C is inverted, as shown in Fig. (4), we find that the sum of any two contiguous numbers has the constant value 10.

Next, moving scale C to the left until its index is opposite 8 on D, as in Fig. (5), we find that the sum of any two contiguous numbers has the constant value 8. Moving scale C more to the left until the index of C is opposite 7 on D, the sum of any two contiguous numbers has the constant value 7, and so on for the whole length of the scale.

Inasmuch as the *difference* of any two numbers is constant for any adjustment when the scales are in normal position, and the *sum* of any two numbers is constant for any adjustment when one scale is inverted, Rules (1) and (2) require reversal for application under the latter condition.

Hence we have

Rule (3).—To add two numbers (with scale C inverted), set one number on scale C to the other number on scale D, and below the index of scale C read the sum on scale D.

Rule (4).—To subtract one number from another (with scale C inverted), set the index of scale C to the subtrahend on scale D, and under the minuend on scale C read the difference on scale D.

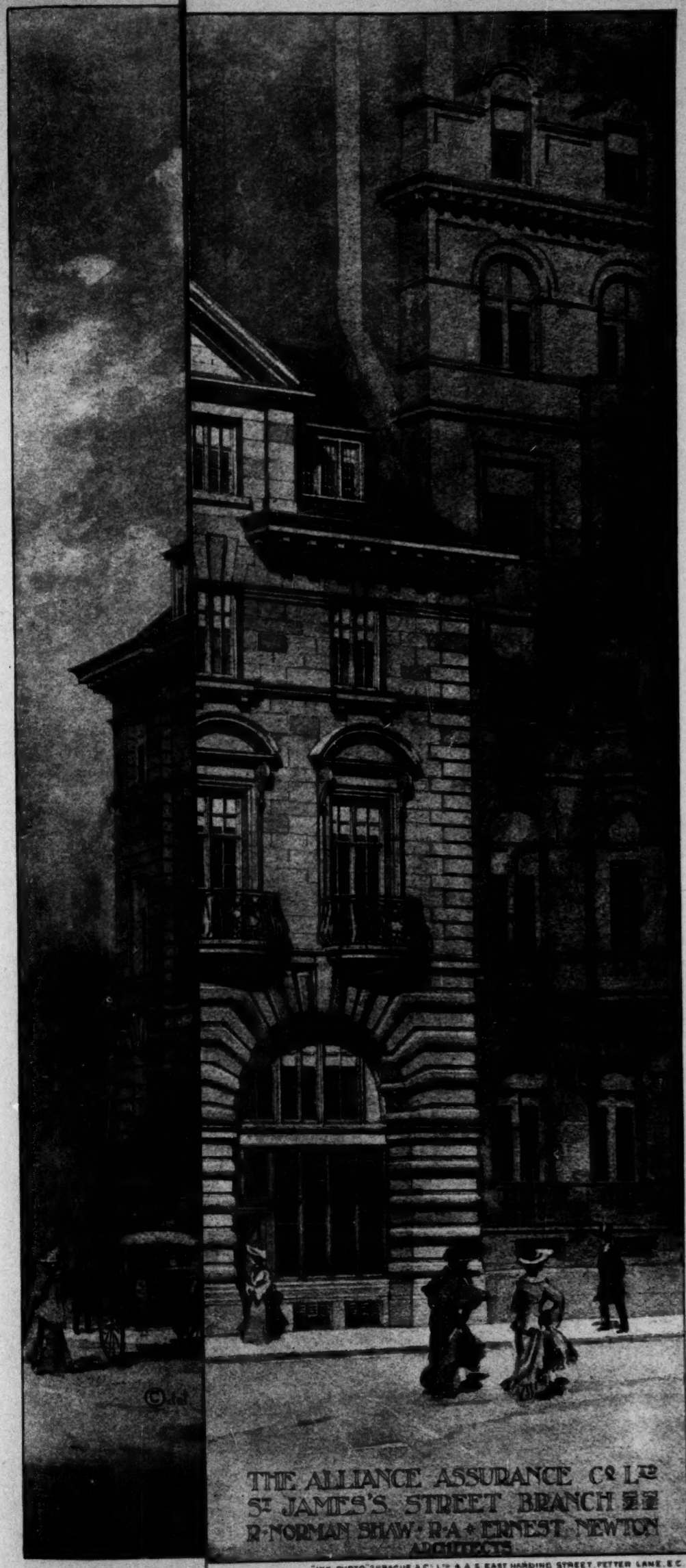
From the foregoing it is evident that by the aid of two exactly similar decimal scales any two numbers may be added or subtracted with great facility and with perfect accuracy to as many decimal places as are provided for by the subdivision of each unit length of the two scales. There is nothing to be gained by inverting one of the scales as described above for the purposes of addition and subtraction, but we shall see later the manner in which the inversion of a scale can be turned to useful account.

The operations of addition and subtraction are so simple that mechanical aid is quite unnecessary. Multiplication and division stand on a different footing, but cannot be conducted by the aid of two scales such as we have been considering.

If, however, we substitute for equal divisions from 1 to 10 graduated divisions corresponding to the logarithms of the numbers 1 to 10, the rules of logarithmic computation are brought into play. Consequently the attempt to perform addition and subtraction results in multiplication and division.

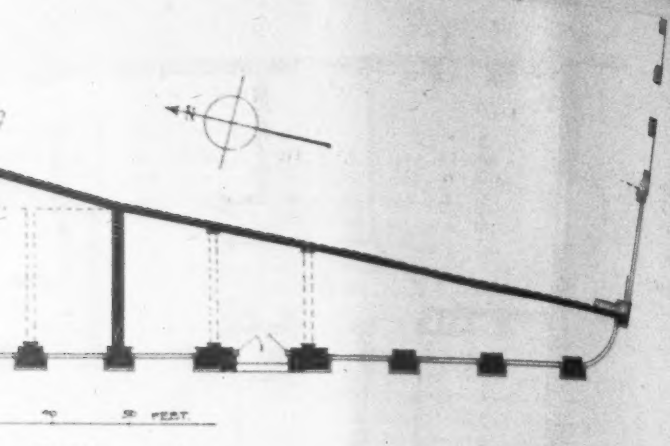
In Fig. (6) we have the elements of a slide-rule graduated logarithmically, the first figure being 1 instead of 0, as in the case of an ordinary scale, since $\log. 1 = 0$.

Now, assuming the index of scale C to be set opposite 1·5 on scale D, as in Fig. (7), every number indicated on scale C



"INK-PHOTO" SPRAGUE & Co Ltd 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.

LAND ROW



ge Buildings. Plan.

petitions.

UNIVERSITY COLLEGE OF NGOR.—The following five n selected by the Council end in competitive designs ngs which it is proposed —Mr. W. D. Caröe, Mr. rpool), Mr. H. T. Hare, Mackenzie, and Mr. Arnold

PEACE.—The competition e at The Hague has been :—First premium, 12,000 Cordonnier, Lille; second, A. Marcel, Paris; third, Franz Wendt, Charlotten- florins—M. Otto Wagner, of 3,000 florins were oward Greenley and Mr. York, and one of 3,000 Schwechten, of Berlin.

RECEIVED.

THERHEAD. By Joseph E. he Homeland Association.

ent's Column.

MATICAL METHODS L DATA FOR ARCHI-

GENERAL PRINCIPLE.

defined, the slide-rule is ument by which logarith- lations can be performed ally.

620 Edmund Gunter, the ssor Briggs at Gresham ic the logarithmic scales ified with his name. By hmic scale and a pair of ons of multiplication and adily performed, as we eek in the explanation of

ntary form the slide-rule —a body graduated so n a Gunter's scale, and a slide whose functions easure with those of the xercised in a far more expeditious manner.

nciple of a slide-rule can a very simple manner by graduated scales C and e by side, as shown in ng C until 0, which we is opposite 2 on D, and relative positions of the e two scales. It will be when the index of C is value of every figure on that of the contiguous e difference of any two for any adjustment of index of C were set value of every figure on than that of the con- if the index of C were he value of every figure more than that of the contiguous figure on C, and so on for the whole length of the scale.

Thus we are enabled to add any two integers, mixed numbers, or fractions within the range of the two scales by following the rule:—

Rule (1).—To add two numbers, set the index of scale C to one of the factors on scale D, and under the other factor on scale C read the sum on scale D.

Conversely, we are enabled to perform subtraction by observing the rule:—

Rule (2).—To subtract one number from another, set the subtrahend on scale C to the minuend on scale D, and under the index of scale C read the difference on scale D.

If we now place the two scales so that C is inverted, as shown in Fig. (4), we find that the sum of any two contiguous numbers has the constant value 10.

Next, moving scale C to the left until its index is opposite 8 on D, as in Fig. (5), we find that the sum of any two contiguous numbers has the constant value 8. Moving scale C more to the left until the index of C is opposite 7 on D, the sum of any two contiguous numbers has the constant value 7, and so on for the whole length of the scale.

Inasmuch as the *difference* of any two numbers is constant for any adjustment when the scales are in normal position, and the *sum* of any two numbers is constant for any adjustment when one scale is inverted, Rules (1) and (2) require reversal for application under the latter condition.

Hence we have

Rule (3).—To add two numbers (with scale C inverted), set one number on scale C to the other number on scale D, and below the index of scale C read the sum on scale D.

Rule (4).—To subtract one number from another (with scale C inverted), set the index of scale C to the subtrahend on scale D, and under the minuend on scale C read the difference on scale D.

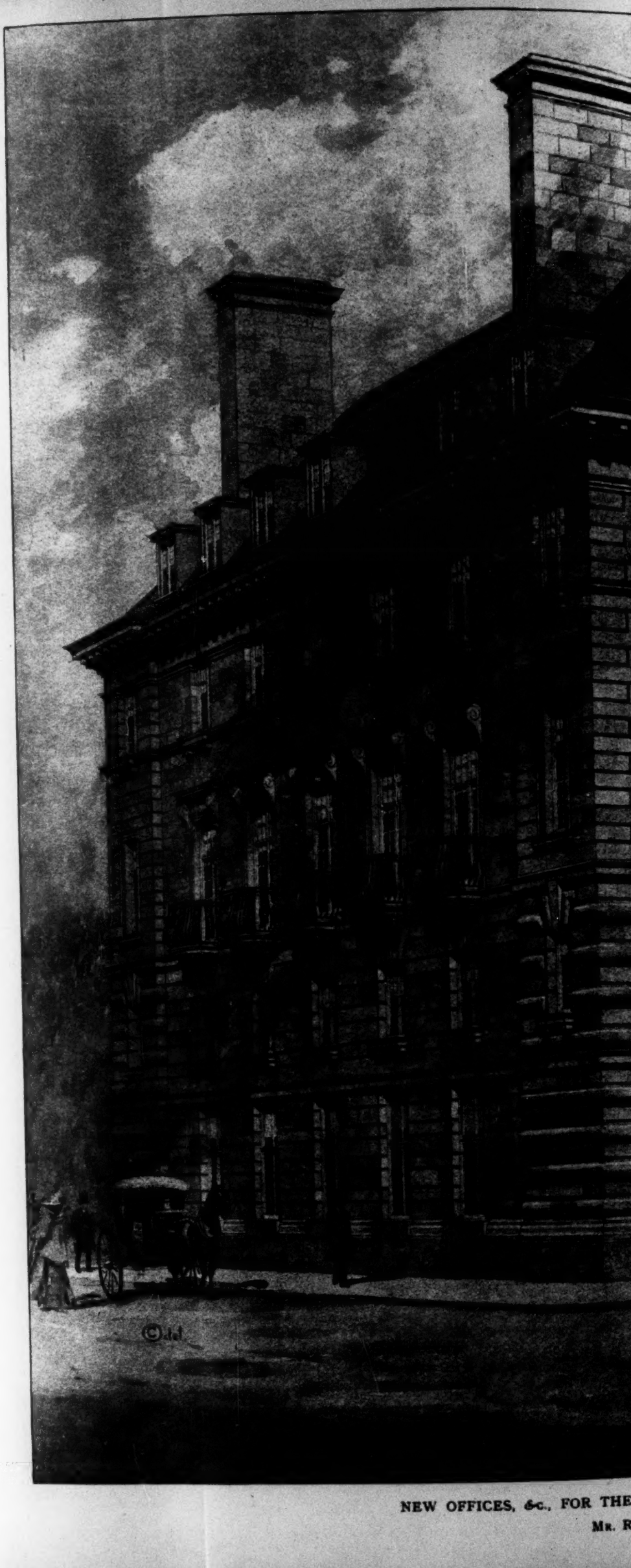
From the foregoing it is evident that by the aid of two exactly similar decimal scales any two numbers may be added or subtracted with great facility and with perfect accuracy to as many decimal places as are provided for by the subdivision of each unit length of the two scales. There is nothing to be gained by inverting one of the scales as described above for the purposes of addition and subtraction, but we shall see later the manner in which the inversion of a scale can be turned to useful account.

The operations of addition and subtraction are so simple that mechanical aid is quite unnecessary. Multiplication and division stand on a different footing, but cannot be conducted by the aid of two scales such as we have been considering.

If, however, we substitute for equal divisions from 1 to 10 graduated divisions corresponding to the logarithms of the numbers 1 to 10, the rules of logarithmic computation are brought into play. Consequently the attempt to perform addition and subtraction results in multiplication and division.

In Fig. (6) we have the elements of a slide-rule graduated logarithmically, the first figure being 1 instead of 0, as in the case of an ordinary scale, since $\log. 1 = 0$.

Now, assuming the index of scale C to be set opposite $1.5 = 1.5$ on scale D, as in Fig. (7), every number indicated on scale C



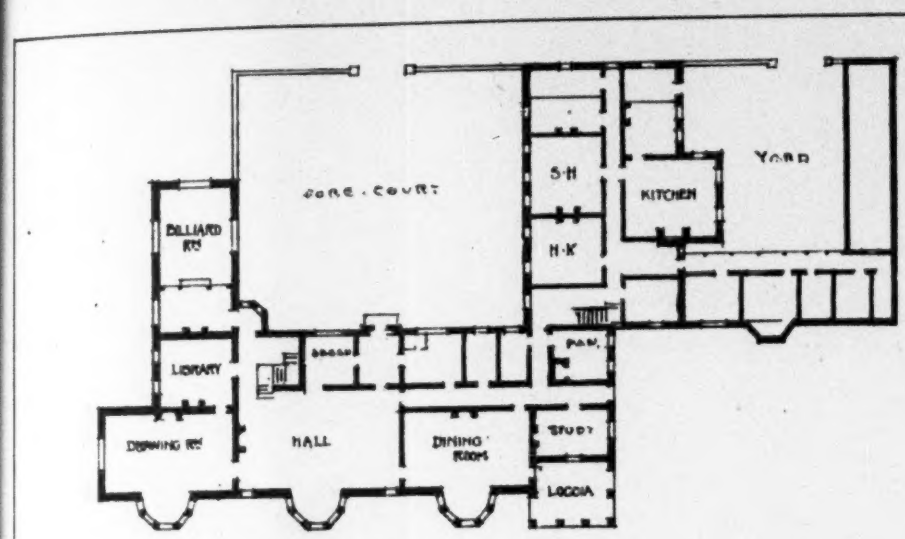
NEW OFFICES, &c., FOR THE

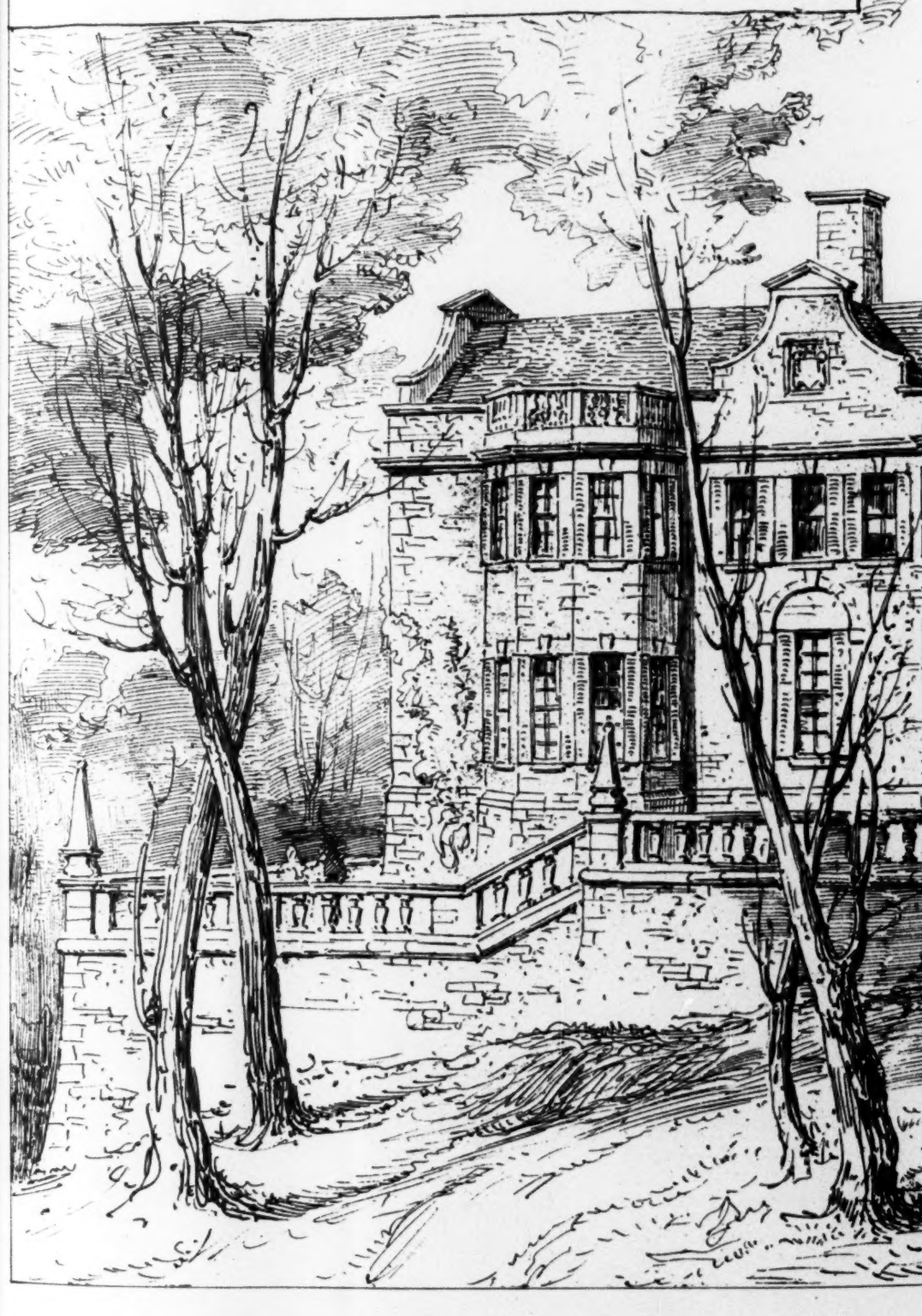
MR. R

"INK-PHOTO" SPRAGUE & Co LTD 4 & 5 EAST HARDING STREET, FETTER LANE, E.C

&c., FOR THE ALLIANCE ASSURANCE COMPANY, ST. JAMES'S STREET AND CLEVELAND ROW

MR. R. NORMAN SHAW, R.A., AND MR. ERNEST NEWTON, JOINT ARCHITECTS.


CORE · COURT
BILLIARD RM
LIBRARY
DRAWING RM
HALL
DINING ROOM
STUDY
LOGGIA
PAN.
S·H
H·K
KITCHEN
YARD



BUSBRIDGE HALL. GODALMING. FOR PERCY GRAHAM ESQ ERNEST GEORGE & YEATES ARCHITECTS.

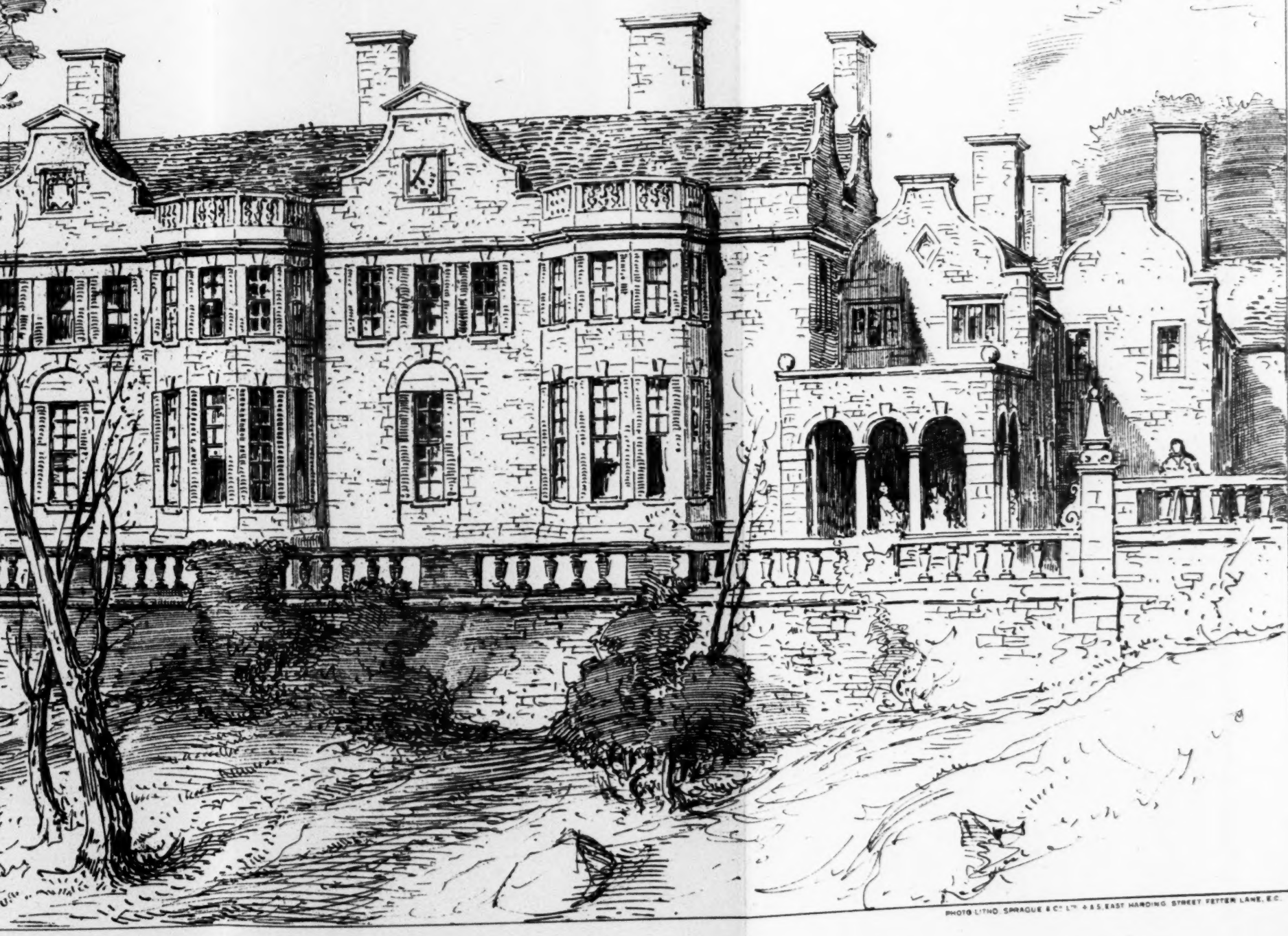
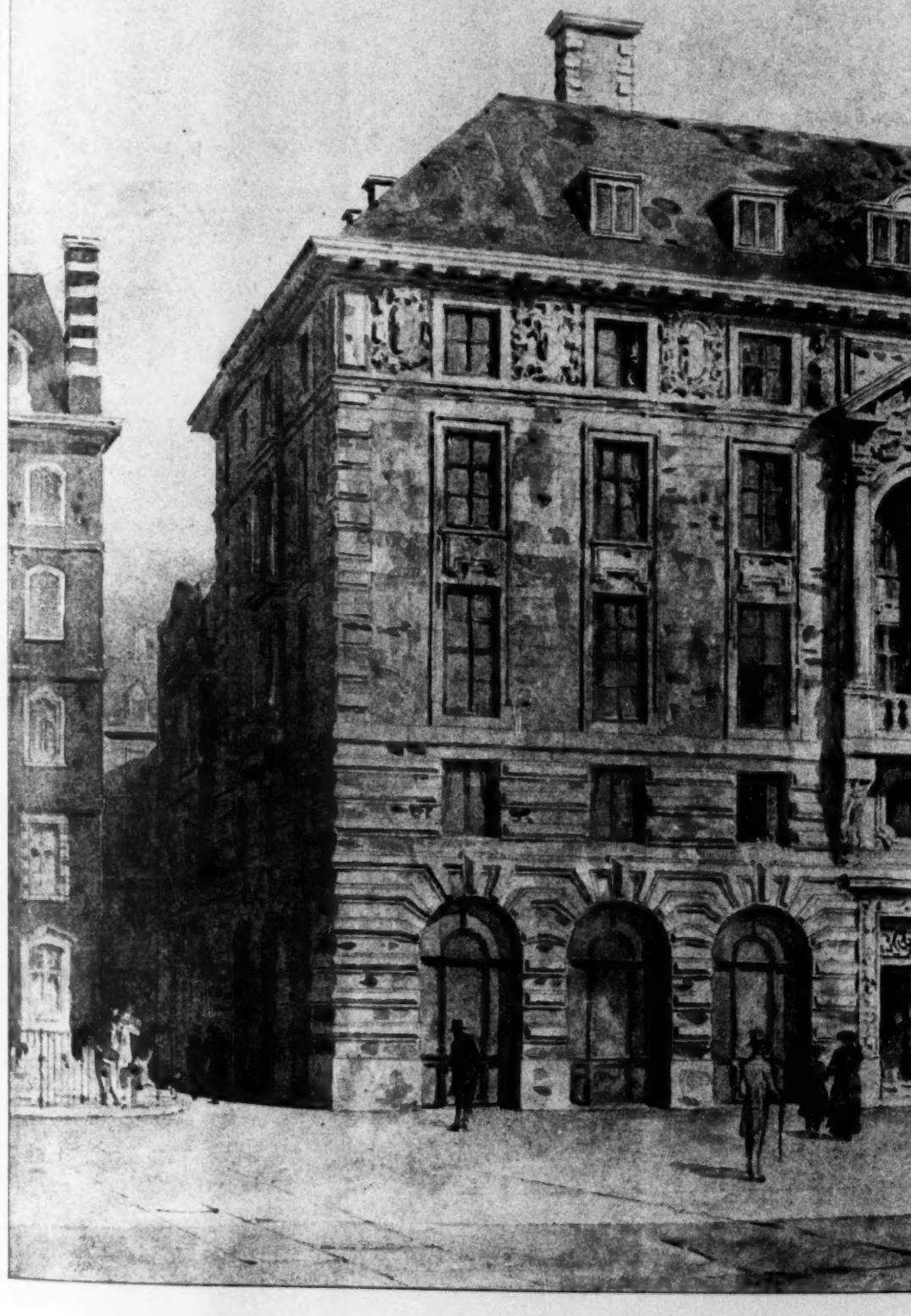
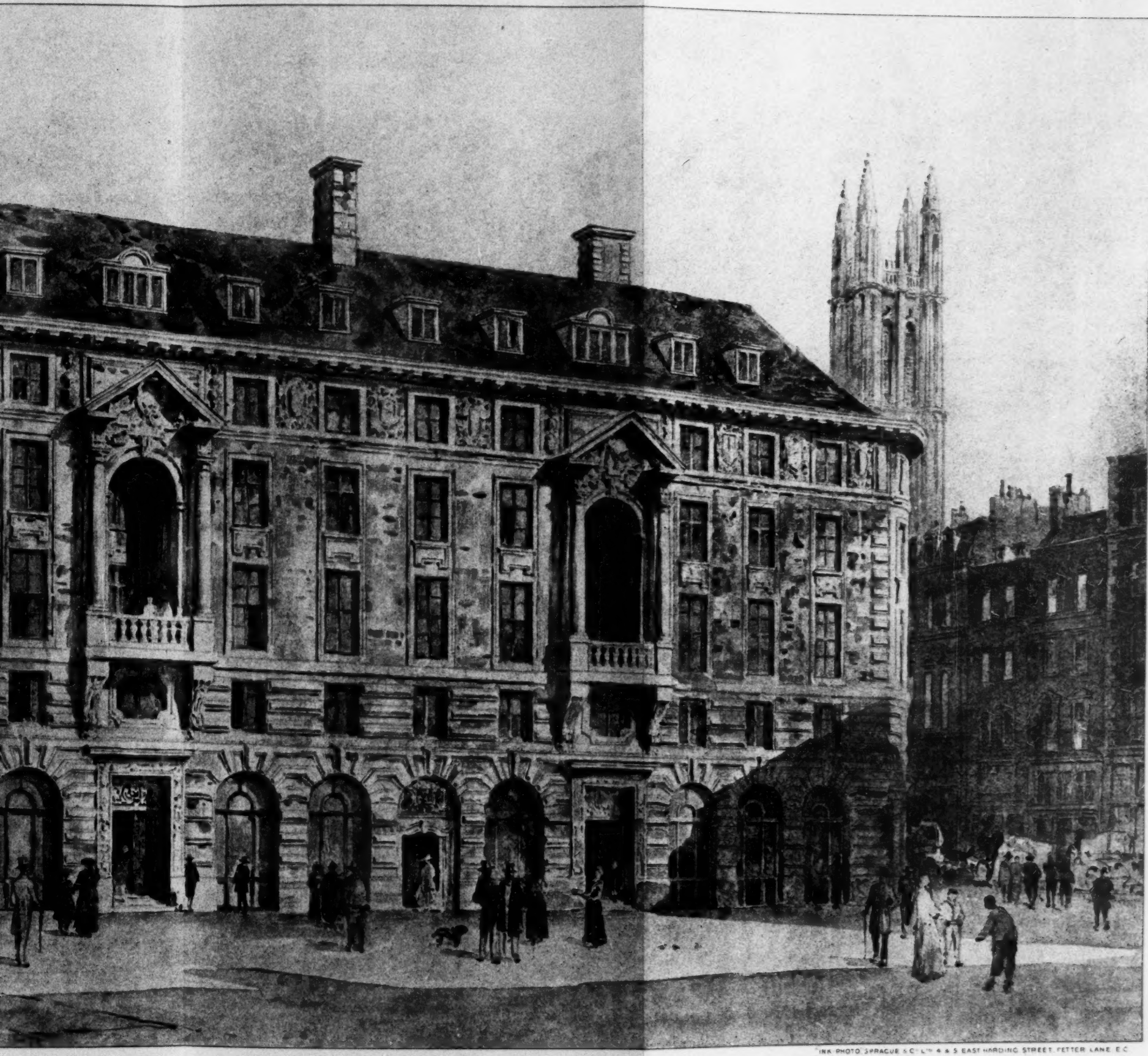


PHOTO LITHO. SPRAGUE & Co. LTD. 4 & 5, EAST HARDING STREET, FETTER LANE, E.C.

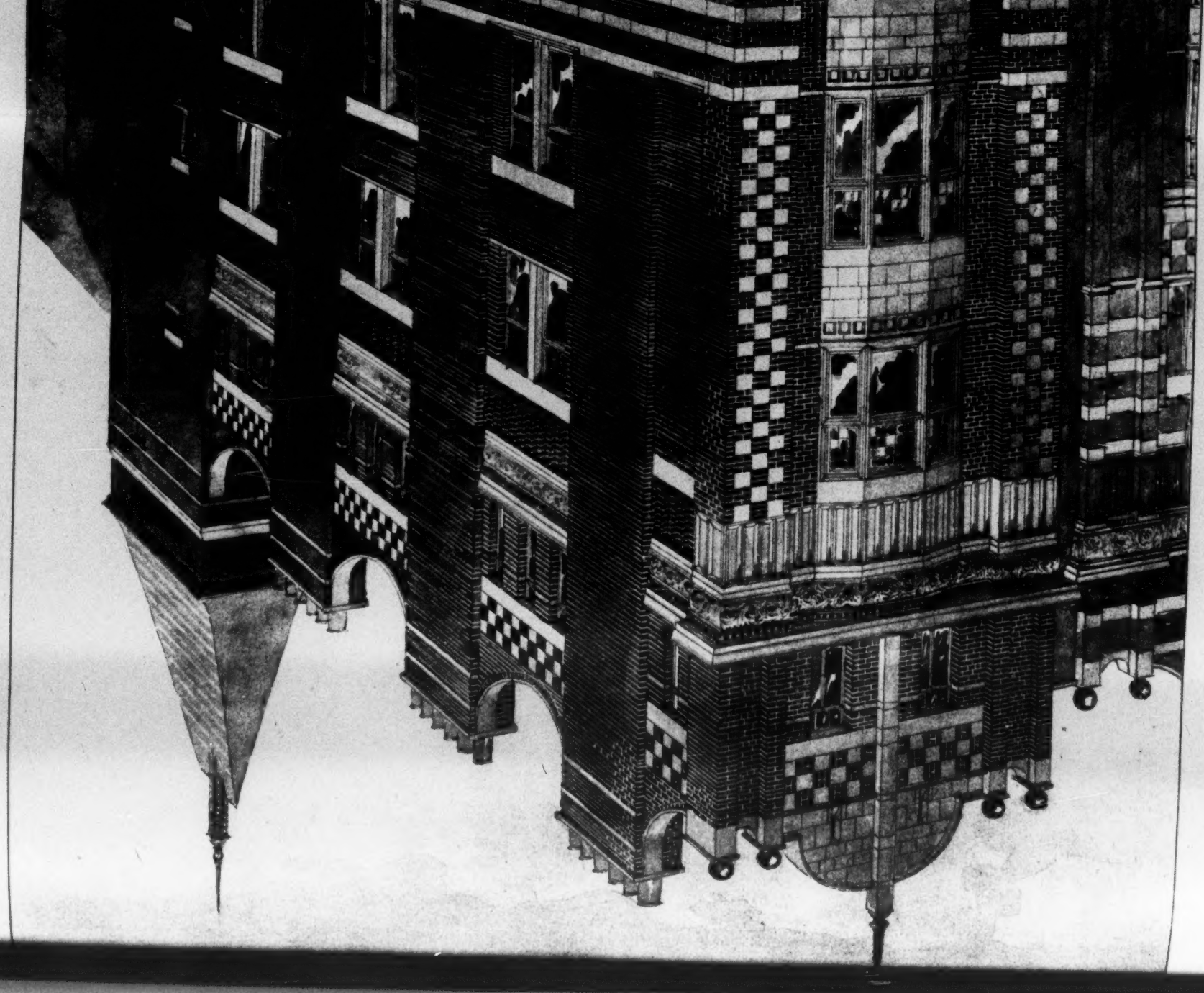
ROYAL EXCHANGE BUILDINGS.

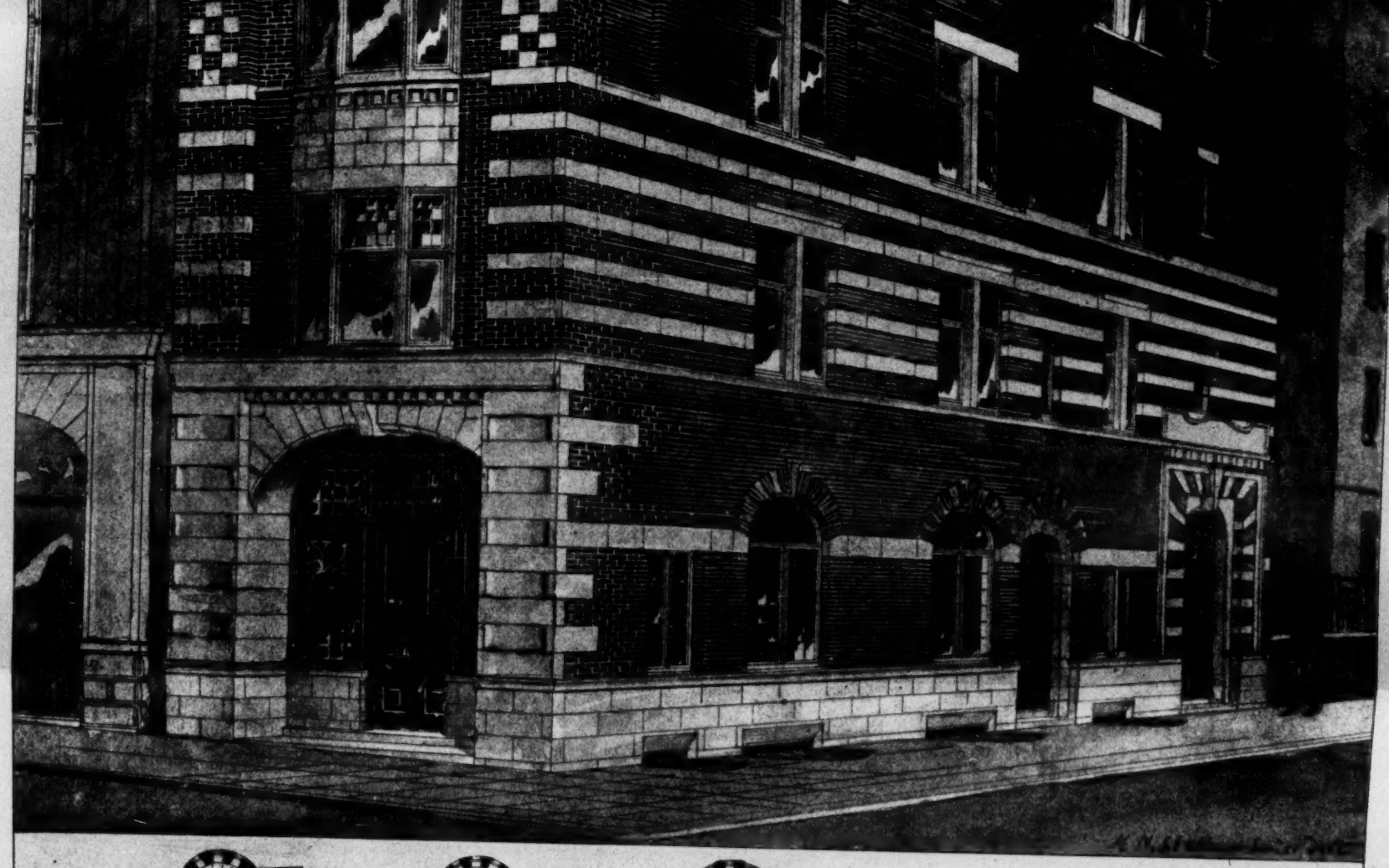
ERNEST GEORGE & YEATES, ARCHITECTS.

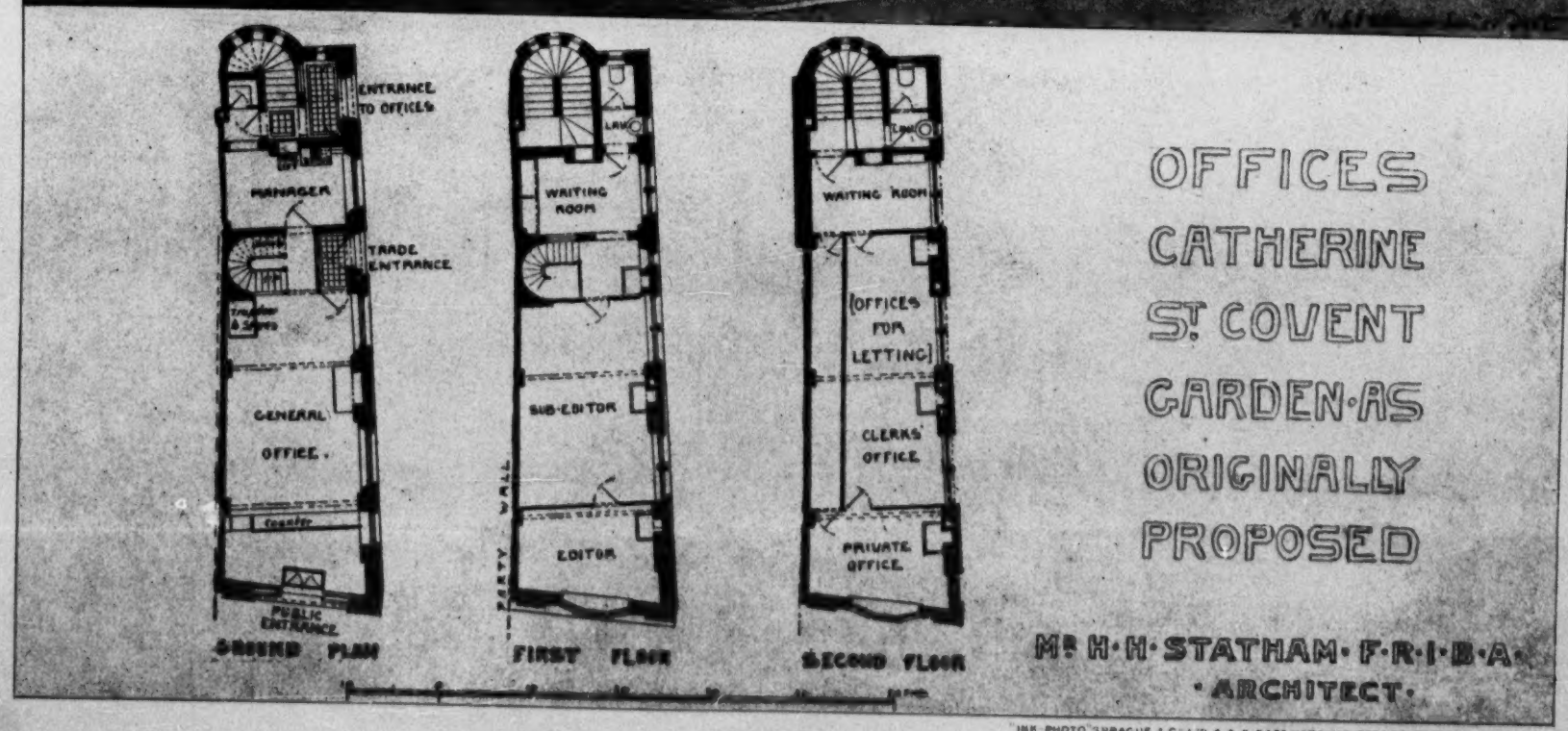




INK PHOTO SPRAGUE & C° L™ 4 & 5 EAST HARDING STREET, FETTER LANE, E.C.







INK-PHOTO SPRAGUE & C° L^TD 4 & 5 EAST HARDING STREET FETTER LANE E.C.

points to 1·5 times its value on scale D. If the index of scale C be set opposite 2 on scale D, every number indicated on scale C points to twice its value on scale D, and so on for all other numbers until the product falls beyond the limit of scale D.

When the index of scale C has been slid to the right hand as far as the geometric mean between 1 and 10, no products higher than $(3{\cdot}16+ \times 3{\cdot}16+) = 10$ can be read on scale D.

To get over this difficulty scale D might be increased in length so as to give readings up to 31·6, thereby permitting the higher numbers of scale C to be used as multipliers.

But such an expedient is unnecessary, for the added portion of scale D would be simply a repetition of the first part of the same scale. We can obtain the same result by sliding scale C to the left, and using the right-hand end as an index (see Fig. 8).

Then, considering the decimal point to be shifted one place to the right, all products up to 100 can be read on scale D. Thus in Fig. (8) the right-hand index is set so that all products from 10 to 60, obtained by multiplying 6 by whole numbers or mixed numbers, are given on scale D. It will be understood, of course, that by suitable adjustment of the decimal point products read on scale D may represent tens, hundreds, thousands, millions, and so on, or tenths, hundredths, thousandths, millionths, and so on, and that the same treatment can be applied to multipliers and multiplicands.

The theory underlying the two methods of employing the sliding scale C for multiplication ought to be clearly realised.

When scale C is moved towards the right we have

$$log.\ a + log.\ b = log.\ ab.$$

As illustrated in Fig. (9) :—

$log.\ a = 2$ and $log.\ b = 3$, $\therefore log.\ ab = (2 \times 3) = 6$.

As illustrated in Fig. (10) :—

$log.\ a = 3{\cdot}5$, $log.\ b = 3$, $\therefore log.\ ab = x$.

We cannot read the value of $log.\ ab$, because the product is beyond the end of scale D. Therefore we must use the right-hand index of scale C and the left-hand half of scale D.

When scale C is moved towards the left $log.\ 10$ is automatically deducted, and we have

$$(log.\ a + log.\ b) - log.\ 10 = log. \begin{cases} ab \\ 10 \end{cases}$$

Therefore to obtain the correct result we must shift the decimal point one place to the right.

As illustrated in Fig. (11) :—

$$log.\ a = 3{\cdot}5,\ log.\ b = 3,\ \therefore log.\ ab = \frac{3{\cdot}5 \times 3}{10} = 1{\cdot}05$$

Shifting the decimal point one place to the right gives $1{\cdot}05 \times 10 = 10{\cdot}5$, which is the correct result.

Two points now deserving special notice concerning the multiplication of whole numbers are :—

(1) That when the product is obtained with scale C projecting to the right hand the number of figures in the product is one figure fewer than the number of figures in the two factors.

Thus

$2 \times 3 = 6$
$2 \times 30 = 60$
$20 \times 30 = 600$
and so on.

(2) That when the product is obtained with scale C projecting to the left hand, the number of figures in the product is the same as the number of figures in the two factors.

Thus

$3{\cdot}5 \times 3 = 10{\cdot}5$
$35 \times 3 = 105$
$350 \times 3 = 1050$
and so on.

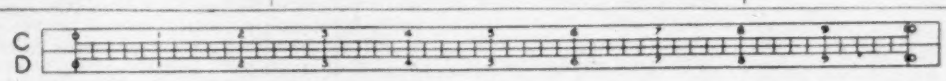


FIG. 2

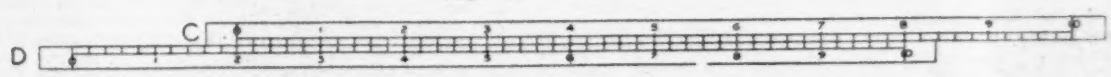


FIG. 3

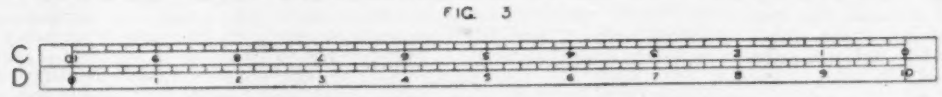


FIG. 4

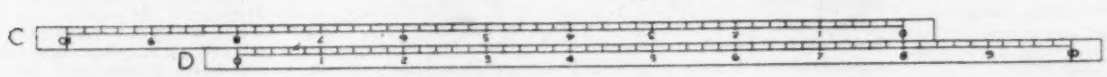


FIG. 5

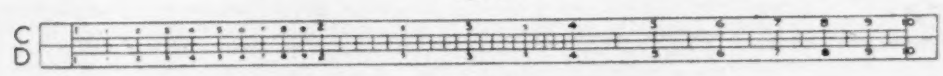


FIG. 6

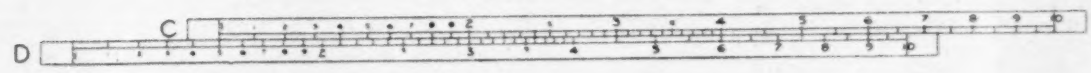


FIG. 7

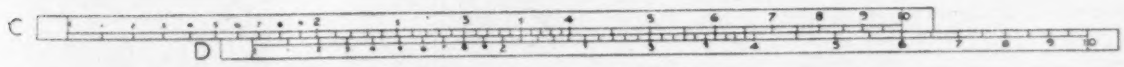


FIG. 8

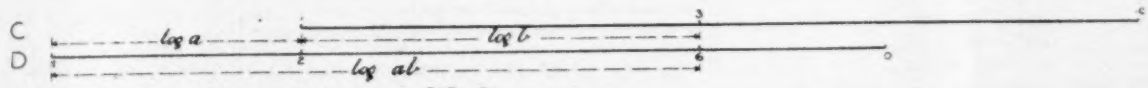


FIG 9

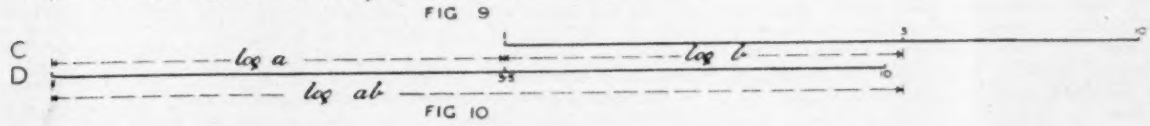


FIG 10

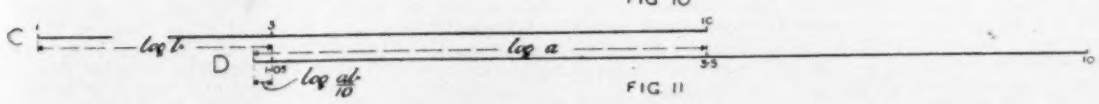


FIG 11

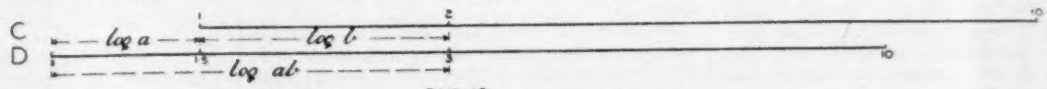


FIG 12

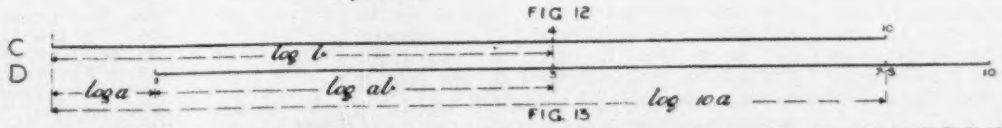


FIG 13

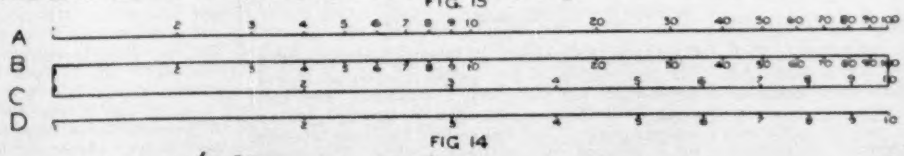


FIG 14

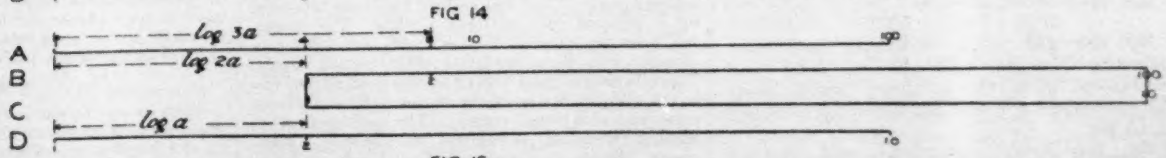


FIG 15

Illustrations to Student's Column.

In using scales C and D for division the process is a reversal of that adopted for multiplication.

The divisor on scale C is set opposite the dividend on scale D, and the quotient is read on scale D under the left-hand or the right-hand index of scale C.

When the significant figures of the divisor are not greater in face value than the significant figures of the dividend, scale C must be moved towards the right so that the left-hand index may point to the quotient.

Thus, as illustrated in Fig. (12), to divide 3 by 2 the figure 2 on scale C must be set opposite to figure 3 on scale D, and the quotient is found at 15 = 1·5 on scale D. The same figures answer equally for $0{\cdot}3 \div 0{\cdot}2 = 1{\cdot}5$, $30 \div 2 = 15$, $300 \div 20 = 15$, $3000 \div 200 = 15$, and so on.

But when the significant figures of the divisor are greater in face value than the significant figures of the dividend, scale C must be moved towards the left, so that the right-hand index may point to the quotient.

Thus, as illustrated in Fig. (13), to divide 3 by 4, the figure 4 on scale C must be set opposite to figure 3 on scale D, and the quotient is found at 75 = 0·75 on scale D. The same figures answer for $0{\cdot}3 \div 0{\cdot}4 = 0{\cdot}75$, $30 \div 4 = 7{\cdot}5$, $300 \div 4 = 75$, $3000 \div 4 = 750$, and so on.

The theory underlying these two methods of performing division is illustrated below.

When scale C is moved towards the right we have

$$log.\ ab - log.\ b = log.\ a.$$

As shown in Fig. 12 :—

$log.\ ab = 3$, $log.\ b = 2$, $\therefore log.\ a = 3 \div 2 = 1{\cdot}5$

When scale C is moved towards the left the answer has to be read below the right-hand index, and *log.* 10 is automatically added to the quotient. Then we have

$$(log.\ ab - log.\ b) + log.\ 10 = log.\ 10a.$$

Therefore to obtain the correct result we must shift the decimal point one place to the left.

As shown in Fig. 13 :—

$log.\ ab = 3$, $log.\ b = 4$, $\therefore log.\ a = \frac{10 \times 3}{4} = 7{\cdot}5$.

Shifting the decimal point one place to the left gives $7{\cdot}5 \div 10 = 0{\cdot}75$, which is the correct result.

Two important points to be noted in connexion with the division of one whole number by another are :—

(1) That when the quotient is obtained with scale C projecting to the right hand it contains one figure more than the difference between the number of figures in the dividend and the divisor.

Thus

$3 \div 2 = 1{\cdot}5$
$30 \div 2 = 15$
$300 \div 20 = 15$
and so on.

(2) That when the quotient is obtained with scale C projecting to the left hand it contains the same number of figures as the difference between the number of figures in the dividend and the divisor.

Thus

$30 \div 4 = 7{\cdot}5$
$300 \div 4 = 75{\cdot}$
$3000 \div 4 = 750{\cdot}$
and so on.

The foregoing explanation should make clear, so far as concerns multiplication and division, the mechanical principle of the slide-rule, and the manner in which the mathematical principle of logarithmic calculation is combined therewith.

It should also serve to suggest the great saving of time to be effected by means of the slide-rule as compared with the use of logarithmic tables.

Of course, the very simple computations dealt with above could be performed with greater speed by mental arithmetic than by the employment of a slide-rule or a table of logarithms.

But take as an example

$$17{\cdot}98 \times 5{\cdot}675 = 102{\cdot}0+.$$

By the aid of a slide-rule with two logarithmic scales each 10 in. long and graduated with the ordinary subdivisions the approximate result 102·0 can be obtained in 15 sec.

By *four-figure* logarithms and antilogarithms (Tables XIV. and XV.) the result 102·1 may be obtained in about 50 sec.

By ordinary arithmetic the result 102·0365 is obtainable in about 70 sec.

Again, take an example such as

$$\frac{2620 \times 348 \times 575 \times 83}{1740 \times 68{\cdot}75 \times 470 \times 34{\cdot}4} = 22{\cdot}5+$$

We have worked this out by the three methods, with the following results :—

By slide-rule	Result 22·5	time	70 sec.
By logarithms	„ 22·5	„	150 sec.
By arithmetic	„ 22·498	„	500 sec.

When we come later to inquire into the wonderful facilities offered by the slide-rule for dealing with more complicated calculations, wherein the powers and roots of numbers are involved as well as multiplication and division, it will be seen that the advantages of the instrument as a labour-saving device are still more marked.

This preliminary chapter may be closed appropriately by calling attention to the simple arrangement, included in all parallel slide-rules, by which the square and square root of any number can be instantly found. The arrangement is illustrated diagrammatically in Fig. 14, where in addition to scales C and D we have two other scales, A and B, the latter marked on the upper edge of scale C and the former assumed to be connected with scale D, but at a sufficient distance to permit the slide, on which are scales B and C, to be moved freely between scales A and D.

The graduations on scales A and B are exactly one-half the length of the graduations on scales C and D, and, as the graduations are logarithmic, the effect is that every number (n) indicated on scale D has opposite to it on scale A a number representing *log.* $n \times 2$, and the same relation exists between scales C and B. Conversely, every number indicated on scale A has opposite to it on scale D a number representing *log.* $n \div 2$, and the same relation exists between scales B and C.

We have already shown in Article XIV. that when the logarithm of a number is multiplied by 2 the result is the logarithm of the square of the number, and that when the logarithm of a number is divided by 2 the result is the logarithm of the square root of the number. These principles applied in the manner illustrated by Fig. 14 give the squares and square roots of all numbers without calculation of any kind beyond suitable adjustment of the decimal point. It is only necessary to find on scale D the number whose square is desired and to look on scale A for the result, and, conversely, to find on scale A the number whose square root is desired and to look on scale D for the result.

Further, as the same relation exists between the numbers on scales B and C, it is almost as easy to find the cube of any number.

In Fig. 15 the slide is drawn to the right so that the index of scale C points to 2 on scale D; the index of scale B points to 4, its square, on scale A; and the number 2 on scale B is opposite 8, its cube, on scale A. In the same way are obtained the square and cube of any other number.

Although the square root of any number on scale A can be instantly found, the extraction of a cube root requires special manipulation, which will be described in a succeeding article.

It should be remarked, however, that by adding another scale with graduations one-third the length of those on scale D, the cube and cube root of any number can be read directly on scales A and D respectively, and, as we shall see later, the logarithmic principle has been extended in this manner to the construction of slide-rules.

☛ CHURCH RESTORATION, BISHOP MIDDLEHAM.—The restoration of the parish church of Bishop Middleham has just been completed. The high pews have disappeared, and in their places are modern seats. The flat ceiling has been replaced by a pitched roof of dark timber. The organ has been transferred to the north aisle, and the chancel has been reseated with carved stalls. There is now a choir vestry at the west end of the south aisle, and the whole of the walls have been plastered and tinted cream. The architects were Messrs. Stephen Wilkinson & Crowley, Newcastle, Messrs. G. Gradon & Son, Durham, being the contractors. The undertaking has cost about 1,000*l*.

Obituary.

MR. SALOMONS.—We regret to announce the death, on May 12, at Ireton Bank, Platt-lane, Rusholme, Manchester, of Mr. Edward Salomons, of Prudential-chambers, No. 78, King-street, Manchester, and until lately of No. 39B, Old Bond-street, London, in his 79th year. Mr. Salomons was elected an Associate in 1851, and in 1860 a Fellow of the Royal Institute of British Architects, and served as a member of the Council. Mr. Salomons was the architect, in conjunction with Mr. John Ely, of a house at Knutsford, for Mr. C. J. Galloway (October 3, 1855, with two plans *); Beeston Lodge, Chester, about twenty years ago; and of the Midland Bank, Manchester. He was joint architect with Mr. R. Selden Wornum of a house at Françon, Biarritz, for Mr. J. Pennington Mellor (June 21, 1884 *); with Mr. J. P. Jones of Caen Wood Towers, Highgate, for Mr. E. Brooke (June, 1870, and June 1, 1872 *); and with Mr. A. Steinthal of the Crematorium, Manchester (October 22, 1892, two views, plan, and canopy of the bier-platform *), and also for the reconstruction, with additional floor, stabling, etc., of Alvaston Hall, Nantwich, for Mr. A. Knowles (April 17, 1897, drawing, three plans, and three drawings of the interior*). He was joint architect with Mr. N. S. Joseph of the Synagogue in Chichester-place, Harrow-road, N.W., in 1862-3; in September, 1897, he was deputed to make the designs for the case of the organ in the Royal Manchester College of Music. Mr. Salomons was appointed to act as assessor in the competitions for the Salford School Board School in John-street, in 1892, and the North Wales Counties Asylum at Denbigh, in 1894. In our numbers of April 11 and May 2, 1896, we published illustrations of a set of five water-colour sketches drawn in Bruges by Mr. Salomons, comprising views taken from the Quai de Rosaire, with the belfry in the distance, and from the Place de la Vigne, with the entrance to the Béguinage, and some of the old and picturesque houses on the canal-banks. On May 8, 1897, we published four of his drawings (then in the New Gallery), taken in Bretagne, illustrating St. Malo; some old houses in Morlaix; La Porte du Roi, Mont St. Michel; and La Maison Duguay-Trouin, St. Malo.

MR. GEORGE LOW.—We have to record also the death, at the age of 82, of Mr. Geo. Low, architect, who had kept up his professional work till within a few weeks of his death. At the early age of 14½ years he was placed in the offices of George Smith (Surveyor to the Mercers Company) and Wm. Barnes, with whom he served his articles. In 1842 he was elected a student of the Royal Academy of Arts, and in 1844 was awarded, by the Council of the Academy, the first silver medal for the best measured drawings of the Church of St. Mary, Woolnoth. These drawings were presented by Mr. Low, some years ago, to the Royal Institute of British Architects' Library. In 1847 he commenced practice, and in 1850 was elected an Associate of the Royal Institute of British Architects, becoming a Fellow in 1860. In 1850 his design for a Town Hall and Market at Hemel Hempstead was selected in open competition, and the building was subsequently erected from his designs, and later added to, in conjunction with his son, Mr. Ralph Low, A.R.I.B.A. In 1855-65 he erected large business premises in Northampton and Dunstable. Subsequently up to his death he enjoyed a very large general practice, varied in character, and consisting of churches, church schools, board schools, private residences, and large commercial premises in the City and elsewhere. Since 1885, in partnership with his son, Mr. Ralph Low, he erected a large number of warehouses, blocks of shops, business premises, and private residences. Mr. Geo. Low was well known as a compensation surveyor and arbitrator, being engaged in a very large number of these cases for the Metropolitan and Metropolitan District Railway in the acquisition of property for the construction of their lines, and was one of the arbitrators employed by the Post Office Authorities in connexion with the property required for the new Post Office buildings in St. Martin's-le-Grand. The practice will be continued by his son, Mr. W. Ralph Low.

MR. HENRY FRANCIS FROGGATT.—The death is announced of Mr. Henry Francis Froggatt, the Hereford District Surveyor. The deceased had passed his 75th year.

MR. WRIGHT.—The death, on May 11, at No. 46, Ringstead-road, Catford, S.E., is announced of Mr. Thomas Wright, aged eighty-four years. Mr. Wright was during thirty-five years Clerk of the Works to the Dean and Chapter of Westminster Abbey, and possessed a practical knowledge, which we believe was almost unrivalled, of the structural history of the Abbey and its appurtenant buildings.

CENSUS OF PARIS.—The general totals of the census taken on March 4 show that the population of the capital was then 2,731,728, as compared with 2,660,559 in 1901, and 2,511,629 in 1896.

* Illustrated in the *Builder*.

General Building News.

CHURCH, EVESHAM.—The foundation-stones and bricks in connexion with the new Wesleyan Church which is being built at Avon Bank, Evesham, have just been laid. There will be accommodation for some 950 people, and the complementary buildings will include schools, classrooms, and hall. The designs were selected in a limited competition, and the building will have Stonehouse brick facings relieved with stonework, the face work being in Bath and the weatherings in Taynton stone, while the roof will be of Bangor slates. The church will seat 530 on the ground floor, 150 in the gallery, and forty in the choir gallery. It is proposed to execute the seating and gallery front in American oak, and the roof timbers will be stained to imitate fumed oak. An organ is to be included, at a cost of at least 500*l*. The schools are to accommodate 150 boys and fifty infants on the ground floor, and 150 girls on the first floor, all arranged in classrooms round a large central hall. The cost of the buildings, including the organ, the site, and the minister's house, will be about 8,300*l*. The architect is Mr. Frederic Foster, of Coventry, and the work is being carried out by Messrs. Espley & Co., of Evesham, the amount of whose inclusive contract is 6,350*l*.

BRAMPTON CHURCH TOWER.—On the 10th inst. the Bishop of the diocese dedicated the tower which has been added to Brampton parish church, and which completes the building as originally designed by Mr. Philip Webb. The tower now completed is not so elaborate as that originally designed. The new part of the tower begins at a height of 41 ft. above the floor of the church, and from there to the parapet it rises a further 35 ft., making a total height, if measured from the ground outside, of 82 ft. A feature of the tower is its great width, which averages 25½ ft. on each side, a width which allows an ample space for the bells as well as the very thick walls. The roof is steep and covered with lead, and it is crowned with a spirlet 30 ft. high. The erection of the tower was begun in May last year by Messrs. Laing & Son, Carlisle. Mr. Jack, of Carlisle, has acted as supervising architect for Mr. Webb, whilst Mr. Alexander Routledge has discharged the duties of clerk of the works.

CHURCH RESTORATION, EAST BERGHOLT.—East Bergholt was recently visited by Bishop Sheepshanks, who held a dedication service at the parish church, which has undergone alterations, a new reredos and choir-stalls being constructed. The repairs included a solid underpinning of the south porch; the practical reconstruction of the cupola on the roof, which was much decayed; attention to the stonework and the exterior of the chapel, as well as the relaying of the chancel roof and the North Chapel roof. The entire work has been carried out under the supervision of Mr. T. G. Jackson, R.A., by Mr. Wheeler, of East Bergholt, and the wood carvings and the marble work have been executed by Messrs. Farmer & Brindley.

BAPTIST MISSION CHAPEL, EASTVILLE, BRISTOL.—Memorial-stones of a new Baptist mission chapel at Eastville were laid on the 10th inst. The plans were prepared by Mr. B. Wakefield, and the contract has been let to Mr. Alfred Dowling, of Bishopston. The new building is arranged to accommodate a congregation of 250, with four classrooms and offices. The cost of the scheme is estimated at 1,700*l*.

SCHOOL-CHURCH, TUNSTALL.—The foundation-stone of a school-church for the new district of St. Chad was laid recently on a site in King William-street. Mr. H. Dain was commissioned to design the building, and his plans are being carried out by Mr. C. Cope. Accommodation will be provided for 300, and the work will cost 1,400*l*.

UXBRIDGE-ROAD TABERNACLE.—This new building in Bloemfontein-road, now near completion, has been erected at a cost of just over 3,000*l*. The architect was Mr. R. Norman Hewitt, Shepherd's Bush, and the builders Messrs. T. E. Mills & Son. The general design of the building is Gothic. The front is of red brick, dressed with Bath stone. There are three entrances, one on either side the main door reached by separate flights of granolithic steps. Immediately inside the chapel is a vestibule, separated from the main building by a leaded glass screen to match windows, with Frazzo flooring, and double doors. The windows, all in lead lights, are by Messrs. Froy & Sons, Brunswick Works, Hammersmith. There is seating accommodation on the ground floor for about 350, and in the gallery for about 250.

NEW ELECTRICAL SCHOOL, CHATHAM.—We are informed that the general contractors for this building, referred to in our issue for April 27, were Messrs. W. Pattinson & Sons, Ltd., of Ruskington and London, and that Stuart's Granolithic Stone Company were only sub-contractors for the reinforced concrete beams and floors.

SUNDAY SCHOOL EXTENSION, SOUTHMOLTON.—At Southmolton on the 2nd inst. the foundation-stones were laid of the new classrooms which form an extension of the Wesleyan Sunday schools. The new buildings will be of stone, and will comprise a men's Bible classroom, 18 ft. by 20 ft., a women's classroom, 14 ft. by 18 ft., and two smaller classrooms, the total increasing the available accommodation by about 130. The work is being carried out to plans prepared by Mr. Fred F. J. Sanders, architect, of Southmolton, the contractors being Messrs. W. Sanders & Son.

COUNCIL SCHOOL, HOPE, NEAR CAERGWRLE.—A new elementary school has been opened at Hope by the education authority of Flintshire. The building is of red brick, with the window woodwork painted white and green. There are ornamentations of terra-cotta dressings, with blue slated roof. There is a central hall surrounded by six classrooms, with corridors and cloak-rooms. The accommodation provided is for a total of 330 children, 220 mixed and 110 infants. The total cost is about 3,300*l*. Mr. R. Williams, Brymbo, was the contractor, and Mr. S. Evans (County Council Surveyor), the architect.

SCHOOL, SLIMBRIDGE.—The new school which has been erected by the Gloucestershire Education Committee, in the parish of Slimbridge, was recently opened. The school is built to accommodate 200 scholars—160 boys and girls and forty infants. The architect was Mr. R. S. Phillips, the builders being Messrs. Baxter & Sons, Stroud. Messrs. Crisp & Son, Bristol, supplied the heating apparatus, and the clerk of the works was Mr. A. E Morgan. The cost of the work was about 2,000*l*.

COUNCIL SCHOOLS, HUNTINGDON.—New schools have been erected by the Huntingdonshire County Council, at Huntingdon. The buildings will accommodate 310 in the mixed department, and 140 in the infant department. The cost has been about 5,000*l*. The designs were prepared by the County Surveyor, Mr. Leete, in conjunction with the Organising Secretary, Mr. Cook. The work has been carried out by Messrs. F. B. Thackray & Co., Ltd.

WESLEYAN SUNDAY SCHOOL, LEEDS.—The Park Wesleyan Sunday School, Dewsbury-road, Leeds, was opened on the 12th inst. The total outlay on the new school, which has been erected from designs by Messrs. Danby & Simpson, architects, Leeds, has been 5,000*l*., excluding the value of the building land. The school has a central hall to accommodate 630 persons. There is a gallery round the hall, and from this and the main floor open nineteen classrooms. To the rear of the hall are placed a mission hall capable of seating 150 persons, three other classrooms, and a caretaker's cottage. There is also a basement, which can be used for tea meetings and similar gatherings, accommodating 300 persons. The premises are built of stone.

SUNDAY SCHOOL, TODMORDEN.—Twelve memorial-stones in connexion with York-street New Wesleyan Methodist Sunday School, Todmorden, were laid recently. The large room of the new building will seat about 700 people, and there is to be a suite of classrooms on the ground floor. The estimated cost is 3,600*l*., Mr. Morley, of Bradford, being the architect.

SUNDAY-SCHOOLS, SOUTHPORT.—The new Sunday-schools, which have been erected in connexion with the Baptist Tabernacle, Southport, were opened by Mr. W. P. Hartley, J.P., on May 10. Mr. Francis P. Halsall, of Southport, was the architecct of the new premises, and he has provided about fourteen ordinary classrooms, in addition to the principal rooms. Another feature is the provision of two new staircases from the Tabernacle gallery, there having up to the present been only one winding stone staircase. The large schoolroom, or assembly-hall, occupies the same, but more extended position of the old school, and is 53 ft. long by 32 ft. wide, and has a balcony round three sides, fitted with fixed seats, for the use of scholars occupying upstairs classrooms. The principal entrance to this schoolroom is on the Scarisbrick New-road side, and is semi-octagonal in shape, a staircase leading from thence to the balcony and classrooms. The library adjoins this entrance, and alongside of this come two classrooms on the ground floor and three classrooms coming above. The lower rooms are separated from the main room by patent folding partitions filled in with clear glass. On the opposite side of the school there are two new vestries for minister and deacons, with classroom for about seventy men above. This portion is not yet completed. On the Southbank-road side is the lecture-hall, with separate entrance. It is 36 ft. long by 25 ft. wide and 12 ft. high, and above this are classrooms and kitchen, etc. There is a communicating passage between the Tabernacle and the schools. A special feature is a large mullioned and transomed circular-headed window at the south end of the school. The elevations have been carried out in Burnley red bricks and grey terra-cotta, the latter being from Jabez Thompson's, of Northwich. The school has been coloured internally with Duresco, and the woodwork is of pitch-pine, varnished. The total cost is expected to be about 2,600*l*., exclusive of land and furnishing. The contractors were Messrs. Duxfield Brothers, and the following were sub-contractors:—Brickwork and terra-cotta, Mr. J. Marshall; stonemason, Mr. J. Rimmer; slater and plasterer, Mr. Tom Southworth; plumber, etc., Mr. Wm. Wright; painters, Messrs. Brandreth & Burdon; heating, Mr. Lewis Hill, of Liverpool; lead lights, Messrs. Ockleston & Drayton, Johnson, of Liverpool and Chester.

NAUTICAL SCHOOL, PORTISHEAD.—Princess Christian opened the new nautical school at Portishead on the 5th inst. The structure, which was designed by Mr. Edward Gabriel, and built by Messrs. W. Cowlin & Son, has been erected on a seaside slope, the ground inclining considerably from back to front. The drop in level has been utilised for the construction of a row of arches used as store-rooms and workshops, and having above them a broad, concreted terrace, above which the school itself rises. The block has a frontage of 382 ft. in length. The building consists of two wings, about 45 ft. in height, measured from the terrace pavement, and connected by an ornamental central tower, beneath which is the chief entrance. The central portion of the building is carried up to a height of 70 ft., and is finished off with wood and copper "flèche" of ornamental character. This central tower stands well above the rest of the building, and has a clock in its front face. Red brick dressings and white rough-cast walls indicate the nature of the exterior treatment of this and other parts of the school. On one side of the main entrance in this middle section is located the committee-room, and on the other the captain superintendent's offices, while on its upper floors are cabins for the officers and for the old boys revisiting the institution. Passing through the central entrance hall a visitor would find himself in the gymnasium, a ground-floor building at the rear, 80 ft. by 50 ft., and useful not only for physical exercise, but for meetings and services. Both wings are relieved by smaller towers rising above the roof line, and the stretch of front wall, with its numerous windows, is divided off by red brick pilasters. The roof is also of red tiles. The south-west wing on the ground floor contains the mess-room, with kitchen, officers' mess-room, and stores at the back; at its extreme end is the chief officer's house, and also a residence for the schoolmaster. The ground floor of the north-east wing contains the school accommodation, library, teachers' room, and at its end is the house of the captain superintendent. This residence is a separate building, but has covered communication with the main block, so that the captain superintendent will be able to go round the whole institution without coming into the open. The two upper floors of both wings are devoted to dormitories. The elder boys sleep in hammocks suspended in long lines on each side of the central avenue, while officers' cabins, located at the corners of the dormitories, command a view of each room. These dormitories are large, and, roundly, may be said to accommodate 100 boys in each. The one for the younger lads is fitted with bedsteads instead of hammocks. The heating, hot-water supply apparatus to baths and kitchen, laundry, drying apparatus, etc. has been installed by Messrs. James Crispin & Sons, of Bristol. In the arches of the basement are fixed two large steam Cornish boilers, and steam is supplied from these boilers to patent calorifiers or heaters, one of which generates the hot-water supply. This is stored in a large cylindrical container of 600 gallons capacity, and from this container secondary loop circulation pipes are carried. The heating calorifier connects to a series of heating main pipes which are attached to radiators in the main entrance corridor near the gymnasium, and in each of the classrooms four radiators are fixed, fitted with regulating valves. The calorifiers are also fitted with Row's Patent Attachment, which allows of steam being automatically shut off when any desired temperature is registered by the thermometer on the calorifiers. The condensed water from the calorifiers is carried to an automatic receiver which pumps the water back to the boiler, and thus ensures economy in maintenance. In connexion with the sanitary arrangements of building the committee adopted the bacteriological treatment system on the plan applied by Mr. F. Wallis Stoddart.—*Western Daily Press.*

PARISH HALL, KINGSTON.—A parish hall has been erected in Park-road, Kingston, in connexion with St. Paul's Church. The hall has been built by Mr. Frank Hawkey (Surbiton) of stock bricks, with red brick dressings and roof of Broseley tiles. There are three entrances to the principal room, which is 48 ft. in length and 27 ft. wide, and has a platform 3 ft. above the floor measuring 18 ft. by 12 ft. From the platform exits have been planned to allow of its use for dramatic representations, and access is also gained to the cloak-rooms and lavatories for men and women on either side. The holding capacity of the hall has been fixed at 550 by the Surrey County Council. The cost, including site, has been about 1,650*l*. The plans for the work were prepared by Major Macaulay.

PUBLIC LIBRARY, ARNOLD.—The new public free library which is being built at Arnold is now nearly completed. The main entrance is central and leads into a hall which will be used as the lending library. On the right is a reading-room, on the left a ladies'-room and reference library. The private room for the use of the librarian is so placed as to command a view of each of the departments. The floors will be of wood blocks,

and the rooms will have a wood dado to the height of 4 ft. 6 in., the upper part of the walls being plastered. Externally the building is of pressed bricks, with stone dressings. The heating will be on the low-pressure hot water system. The tenders were confined to Arnold builders, and the Council accepted that of Messrs. H. Jew & Son, amounting to 1,320*l.* for the library, and 250*l.* for the caretaker's house adjoining. The architect is Mr. H. Higginbottom, of Arnold and Nottingham.

PROPOSED ELECTRIC LIGHT WORKS, WELLINGBOROUGH.—Colonel A. C. Smith, C.E., Inspector of the Local Government Board, attended at the Council Chamber, Wellingborough, on the 1st inst. to hold an inquiry respecting the application made by the Urban District Council to be allowed to let part of their storage-yard to the County of Northampton Electric Power and Traction Company. Evidence supporting the application was given by Mr. E. Y. Harrison, the Surveyor.

CHILDREN'S HOSPITAL, HESWALL.—The foundation-stone of the Liverpool County Hospital for Children, which is being erected at Heswall, was laid a short time ago. The site for the new hospital, comprising 10 acres, is on the side of Heswall Hill, off Telegraph-road. When the complete scheme is carried into effect the buildings will stand in the form of the letter H, the ward wings being connected by the central block, and accommodation for 200 beds will be provided. The total cost will be 60,000*l.*, but at present only the central block, in which temporary ward accommodation can be found for 100 beds until the ward blocks themselves are erected, is being undertaken. This part of the scheme will cost 25,000*l.* The hospital is being built by Mr. W. H. Forde, of Birkenhead, and the architects are Messrs. H. & A. P. Fry, of Liverpool.

GOLF PAVILION, BULWELL FOREST, NOTTINGHAM.—The new pavilion recently erected in Bulwell Forest for the convenience of golfers was opened on the 3rd inst. Mr. F. B. Lewis, the City Architect, prepared the plans for the work.

CYCLE FACTORY, COVENTRY.—Messrs. Harrison & Hattrell, of Coventry, are the architects, and Mr. Gray Hill, also of Coventry, is the general contractor, for a new factory which is now being built, at a cost of upwards of 40,000*l.*, as an extension of their workshops, by the Rudge-Whitworth Company.

MANCHESTER INFIRMARY.—A special meeting of the Royal Infirmary Board was held on the 8th inst. for the purpose of receiving a report from the Building Committee on the tenders received for the superstructure of the new infirmary, and Mr. Hopkinson, Chairman of the Building Committee, in moving the adoption of the report, explained that the work had been divided into sections "A" and "B." Section "A" included four large blocks and all the general medical and surgical departments of the hospital; while section "B" consisted of the lodges, the casualty and special blocks, the out-patients' blocks, the superstructure of the laundry, and the pathological and septic blocks. The architect's estimate of the cost of section "A" was 240,000*l.*, and of section "B" 63,000*l.* The tenders which had been received for section "A" were as follows: Arnold & Son, Doncaster, 239,546*l.*; Brown & Son, Salford, 244,480*l.*; Foster & Dicksee, Rugby, 253,620*l.*; Holloway & Greenwood, Brixton, S.W., 258,277*l.*; Morrison & Son, Liverpool, 251,300*l.*; R. Neill & Son, Manchester, 245,000*l.*; Rowbotham, Birmingham, 256,752*l.* In considering the tenders the committee had not regarded either price or time alone, but with regard to time they asked that the tender should be based on the completion of the contract in September, 1908. By that he meant both sections "A" and "B" together.—The tender of Messrs. Arnold & Son was accepted.

ELECTRIC POWER STATION, BIRMINGHAM.—The new power station in Summer-lane, which is being constructed by the Electric Supply Committee of the City Council for the provision of electricity for lighting and for power, is now nearing completion. The engine-house, which is 270 ft. long, 100 ft. wide, and 65 ft. high, is divided by a central gangway, the high-tension plant being installed on one side and the low-tension plant on the other. The switchboards are situated at the front of the engine-house, mounted upon a gallery. The cables connecting the generators to the switchboard are run along two subways under the central gangway. The boiler-house, which adjoins the engine-house, is equipped with underground flues, so arranged that any battery of boilers can be brought into use as required. When finished the boilers will be arranged in four batteries, each containing six water-tube boilers, fitted with super-heaters and economisers. The coal from the overhead store is automatically fed into mechanical stokers, and the ashes produced will be allowed to accumulate in underground chambers, now in course of construction, from whence they can be fed into a conveyor and taken away. Mr. R. A. Chattock is the City Electrical Engineer and manager, and Mr. J. P. Kemp the resident engineer.

UNIVERSITY SETTLEMENT HALL, CARDIFF.—This building is shortly to be enlarged. Plans have been prepared by Mr. R. Weir Schultz, architect, of London, who also designed the hall, and they have received the approval of the city authorities. The new buildings will be built of Somersetshire red bricks and roofed with pantiles. The walls inside will also have a brick face, and only the ceilings will be plastered. There will be a billiard and smoking room for men and a reading-room as well, while large playrooms are provided for the Lads' and Girls' Clubs, and several classrooms for each. The Mothers' Club will also have a separate room.

BUSINESS PREMISES, NORWICH.—New business premises have been erected in St. Benedict's-street, Norwich. They have been built from the plans of Mr. H. Tooley, architect, Buckhurst Hill, Essex, by Mr. T. Gill, Norwich. The internal lighting has been carried out by the Corporation Electricity Works. Electric bells and gas fittings have been installed by Self Brothers, Norwich, and the general decorations have been carried out by Mr. Taylor, also of Norwich.

FREE LIBRARY, NEWBURY.—On the 2nd inst. a new Free Library was opened at Newbury. The building, which was designed by Mr. S. J. Lee Vincent, Borough Surveyor, has been constructed of red brick, with Monks Park stone dressings. The design is based on the Elizabethan style. On the ground floor there is first the library, with borrowers' space, counter, and indicators for 10,000 volumes. Shelving has been provided for 8,000 volumes, and there is space for a further 2,000 volumes if necessary. Adjoining this room is the librarian's office, overlooking the reading-room. From the reading-room a lobby and staircase leads to the reference-room, 30 ft. by 20 ft., over the lending department. Overlooking the reading-room is a railed-off space forming a balcony. Lavatory accommodation is provided. The cost has been 2,000*l.* Messrs. Hoskings, of West Mills, were the builders.

SWIMMING BATH, CHELMSFORD.—An open-air swimming bath has just been opened by the Chelmsford Corporation. The bath, which with the inclosure covers an area of five-sixths of an acre, is 150 ft. by 100 ft., with a water area of 15,000 square ft. It has a depth of water from 3 ft. to 6 ft., and holds 400,000 gallons. It is constructed partly above and partly below the ground level, and is surrounded by two paved footpaths in the form of terraces, which are formed with the excavation material from the centre of the bath. The bottom of the bath is lined with 1,490 square yds. of concrete flags, grouted together, and the sides are formed of cement concrete. A sand filter 50 ft. by 20 ft. is provided at the end, through which the water passes before entering the bath. On the top terrace, which extends the full length of the site, and stands 2 ft. 6 in. above the water level, thirty-six dressing boxes are erected. There is also an open dressing shed, about 80 ft. long, for free bathers, with caretaker's shed and cycle store adjoining. An island built of timber is fixed in the centre, and arranged in the form of step platforms for diving purposes. In addition there are two spring diving boards. The water is supplied from the river Chelmer, and is conveyed from the dam at Springfield Mill by a 12-in. pipe main to the sand filter. The work has been carried out departmentally under the supervision of the Borough Engineer and Surveyor, Mr. Cuthbert Brown, and the total cost of the works is under 700*l.*

Appointments.

BIRMINGHAM CITY COUNCIL.—The Public Works Committee have decided to recommend that Mr. Henry E. Stilgoe, A.M.I.C.E., Borough Engineer and Surveyor to the Corporation of Dover, be appointed City Surveyor for Birmingham, at a salary of 1,250*l.* per annum, *vice* the late Mr. John Price.

BRITISH SCHOOL, ATHENS.—Mr. R. McG. Dawkins has been elected as Director of the School in the place of Mr. R. C. Bosanquet, whose appointment to the chair of Archæology in the University of Liverpool we recently announced. Mr. Dawkins is a Fellow of Emmanuel College, Cambridge; he has taken a prominent part in conducting the excavations at Palaikrasto in Crete, and is at present Mr. Bosanquet's co-adjutor in the investigations recently undertaken on the site of ancient Sparta.

STAFFORDSHIRE IRON AND STEEL INSTITUTE.—Mr. William Somers, of Halesowen Forge, has been elected President, and Mr. William H. Carder has been re-elected Secretary, for the ensuing year.

Sanitary and Engineering News.

A REINFORCED CONCRETE BRIDGE OF 146 FT. SPAN.—A bold example of concrete-steel construction is to be found in the footbridge recently built across the river at Playa del Rey, California. This bridge has a total length of nearly 206 ft., and crosses the river in a single arch with a clear span of 146 ft. and a rise of 18 ft. The three arch ribs are each 14 in. thick by 24 in. deep at the crown, and spring from abutments of concrete strengthened by grillages of rails and resting on pile foundations. The ribs are reinforced by angle bars, flat bars, and railway rails, and are connected by transverse beams of concrete each reinforced by a railway rail to which iron plates are riveted to form brackets reinforcing the connexion of the main ribs and transverse beams. The floor consists of a 4-in. slab of concrete reinforced by a network of ½ in. diameter bars, 5 in. apart, crossing the bridge diagonally. The centring was struck seven weeks after completion of the concreting, when settlement took place to the extent of ¾ in., but did not increase to more than ¼ in. in all. The bridge was afterwards tested by a dead load of 870 lb. per square foot, with satisfactory results.

MANHATTAN BRIDGE.—It is now hoped in New York that the last controversial question relative to the structural details of the Manhattan Bridge across the East River has been settled by the recent decision of the Bridge Department to carry out the design of their predecessors in office, providing for a cable instead of an eye-bar suspension bridge. No real importance attaches to the point raised, for either type of structure would be perfectly safe and reliable if properly designed and executed. The New York public are little interested in the relative merits of eye-bars and cables—a matter upon which engineers are by no means in agreement. On the contrary, their chief anxiety is to have the bridge opened at the earliest possible date so that the additional cross-river communication may relieve the abnormal crushing which takes place on the Brooklyn Bridge every morning and evening.

CONCRETE-STEEL IN MARINE ENGINEERING.—Owing to the fact that timber employed in tidal waters suffers to a serious extent from attack by the *teredo navalis*, and is also affected by other destructive agencies, the use of concrete-steel is rapidly extending in the construction of wharves, jetties, landing-stages and kindred works, where timber piles and framework were once almost universal. The usefulness of ordinary concrete-steel in the design of wharves and jetties has been sufficiently demonstrated by various examples of such construction at Southampton and elsewhere in the United Kingdom, and as an illustration of the extent to which harbour and other engineers are availing themselves of the valuable properties exhibited by this material the fact is stated on the authority of Mr. L. G. Mouchel, that more than a dozen jetties on the Hennebique system are under construction at the present time. The works in question include two jetties at Haslar, and two torpedo-boat destroyer jetties at Portland for the Admiralty; an isolated breakwater in Waterford Harbour for the Public Works Department of Ireland; a jetty and approach at Hornchurch Marsh for the City Corporation to the designs of Mr. Frank Sumner, M.Inst.C.E., the Engineer to the Public Health Department; a coaling jetty at Erith, and a coal wharf at Rochester, for Messrs. Cory & Co., from the designs of Mr. H. Shoosmith, M.Inst.C.E.; a jetty at Cowes for the Southampton and Isle of Wight Steampacket Company; an important jetty at Newcastle-on-Tyne on 18-in. by 18-in. hollow ferro-concrete piles for the Co-operative Wholesale Society; the Caledon Jetty, Dundee, from the designs of Mr. J. Thompson, M.Inst.C.E., the Harbour Engineer, and a jetty for the Great Western Railway in Plymouth Harbour. Our readers are chiefly interested in reinforced concrete as a material for the construction of buildings, but it may be pointed out that piles of the kind which are suitable for wharves and jetties should be found equally useful in ordinary foundation work as a substitute for timber piles or heavy masses of plain concrete, for timber is apt to decay sooner or later, and weighty foundation blocks and slabs constitute an undesirable additional load upon unstable soil, and so tend to cause settlement of the buildings which they are intended to support.

IRON AND STEEL INSTITUTE.—At the thirty-seventh annual meeting, opened on May 10, the President, Mr. Robert A. Hadfield, presented the Carnegie gold medal to M. Guillet, of Paris, and Mr. W. Rosenhain, of Birmingham, and announced that the Bessemer gold medal for 1906 would be presented to M. Floris Osmond, of Paris, a leading authority upon the diagnosis of steel. The council have recommended that scholarships, each worth 100*l.*, be awarded to Messrs. E. F. Law (London), E. Hess (United States), O. Stutzer (Germany), and C. A. F. Benedicks (Sweden). The statement of accounts for the year 1905 showed that the income amounted to 6,271*l.* and the expenditure to 5,257*l.* In order to meet the cost of publishing the journal and papers of the Institute, Mr. Carnegie has supplemented his previous gift with a sum of 25,000 dollars in 5 per cent. debenture bonds.

MANUFACTURE OF PORTLAND CEMENT.—The *Iron Age* states that the use of producer-gas instead of coal for calcining purposes has been successfully adopted in six rotary kilns by the Diamond Portland Cement Company at Middle Branch, Ohio, with a concurrent saving in expense, fuel, and labour. The kilns are 60 ft. long, with a

diameter of 6 ft.; the tested output amounts to 240 barrels, of 380 lb. per barrel, in 24 hours, with a consumption of 110 lb. of coal-fuel to the barrel. It is claimed that this use of low-grade coal can be applied to existing kilns at a moderate outlay.

ELECTRICAL POWER SCHEME, CALCUTTA.—The *Indian Daily News* describes some proposals which are made to promote a company, with a capital of 300,000*l.*, with the object of supplying electrical current to the mills and factories along the river Hooghly, from a generating-station with mains laid along both banks of the river to a distance of seventeen miles south to Budge Budge, and a distance of twenty-five miles north to the town of Hooghly. Within that area are mills and factories using an estimated amount of 120,000 h.p., exclusively of those within the limits of the Howrah and Calcutta, covered by the existing rights of the Calcutta Electric Supply Association.

SEWAGE DISPOSAL WORKS, NEWCASTLE-UNDER-LYME.—The formal opening of new sewage disposal works, constructed by the Newcastle-under-Lyme Town Council, took place on the 10th inst. Mr. J. E. Willcox (Messrs. Willcox & Raikes, Birmingham) was engineer of the works, and Mr. S. Wilton, jun., Newcastle, was the contractor. The new works have cost about 25,000*l.* There is a new main outfall sewer 820 yds. long, special detritus chamber, and separating apparatus, and old liquefying tanks are utilised. The effluent from the tanks discharges into a main channel, along which it flows into a circular pump, well constructed in brickwork, 25 ft. diameter by 6 ft. 6 in. deep below level of the overflow, and having a capacity of about 28,000 gallons. The pumping plant consists of three sets of 22-h.p. gas engines and 6-in. centrifugal pumps, having a total lifting capacity of 900 gallons per minute. After leaving the pumps the sewage passes through an 18-in. cast-iron rising main to the distributing chambers above the high level filters; these are three in number, each 112 ft. diameter, and having a total area of 3,250 yds. From the high level filters the effluent can be discharged direct to the stream; or, if desired, on to the low-level filters for double filtration.

PROPOSED NEW BRIDGE, STAKEFORD.—At a recent meeting of the committee having in hand the bridging over of the Wansbeck at Stakeford, it was agreed that Messrs. D. Balfour & Son, civil engineers, Newcastle, should be instructed to prepare details and plans of the structure. The new bridge will be made of ferro-concrete, the estimated cost being 8,000*l.*

THE ROYAL SANITARY INSTITUTE.—The following is the list of members and associates elected this month:—*Members*—W. Boby (Salisbury House, E.C.); E. A. Bush (Beeston, Notts); M. E. Collins (London, E.C.); F. Cottle (Douglas, Isle of Man); W. J. Dilley (Gizeh, Cairo, Egypt); R. T. Hayes (Cheltenham); R. L. Honey (Chatham); A. P. Maddocks (Stoneycross, Spondon, Derby); F. E. Marsh (Finchley, N.); W. W. Newman (Loughborough); A. C. Norman (Norwich). *Associates*—H. G. Allen (Metheringham, Lincolnshire); H. Clapham (Ince, near Wigan); D. Grey (Splott, Cardiff); W. Holt (Muizenberg, Cape Colony); W. A. Hulton (Lower Crumpsall, Manchester); D. Llewellyn (Blaengarn, near Bridgend); E. Mantell (Sparkhill, near Birmingham); Miss M. A. Raw (Tooting, S.W.); J. P. Shannon (Dumfries, N.B.); Miss N. C. Stokes (Chelsea, S.W.); Miss E. Swann (Brincliffe, Sheffield); Mrs. A. C. Young (London, S.W.).

Foreign.

ROME.—Mr. Morgan, the British Consul, in his report for the year 1905, just received at the Foreign Office, observes that people who return to Rome after an absence of a decade or so can scarcely recognise the old city under its modern garb, which, however adversely it may affect its archæological interest, cannot but impress the visitor. Its population in the comparatively brief period of twenty years has risen from 345,036 to over 500,000, and the extensive lands around Rome have given way to suburban quarters, which, although unsightly, give shelter to thousands of new comers from all parts of Italy, who contribute their share of individual labour towards the economic development of the city. Numerous new hotels have been built on modern systems, and the discomforts of which so much used to be heard in the past have been removed. Smoking chimney-stacks, quite a new feature among the ruins of the past, mark here and there the presence of rising manufactories. Electric trams have superseded the lumbering omnibuses, and a large and rapid traffic of passengers is carried on daily. Not only the opposite quarters of the town are now connected by the new tram lines, but the pretty small towns near Rome, such as Frascati and Grottaferrata, are now served by them. It is a fact that house rents and the prices of commodities have risen. It was at first supposed that the rise was due to the manœuvres of speculators, but there is every reason for believing that the improved local economic conditions have been determining factors. The scale of wages also tends to increase. It has been the prevalent custom in the past for a great many of the inhabitants of Rome to quit the city on the approach of summer, which fact is justly considered to be seriously detrimental to the economy of the district. A British company is now going to give effect to a plan whereby the inhabitants of Rome will be provided with a summer resort placed in the immediate neighbourhood of the capital. The site chosen for the new summer town is called "Pratone," a small plain, or table-land, surrounded by shady woods of chestnuts, acacias, and oaks. The "Pratone" is 3,210 ft. above the sea level, and general local conditions are reported as being favourable for the carrying out of the object in view—short distance from Rome (twenty-one miles as the crow flies), clear bracing mountain air, the temperature in summer rarely exceeding 70° Fahr., and good water. The company intend running electric carriages between Rome and the "Pratone," which distance they estimate will be covered in an hour. The ascent to the "Pratone" will be effected by means of a series of steep inclines. The electric energy will be derived from the river at Tivoli. The available supply is estimated at 800 horse-power, of which 500 will be required for working the railway and 300 will be utilised for lighting and industrial purposes. A large area on the top of the "Pratone" has been secured for the erection of a hotel and restaurant, as well as for a club house, theatre, etc., the remaining land will be sold to private individuals who may wish to build thereon summer residences. The cost of the railway and buildings is estimated at 150,000*l.* An electric tramway line connecting Rome with the surrounding villages has been opened for traffic. The advantages accruing to the population of the capital will be considerable, inasmuch as it is proposed to build houses for the less favoured classes in the districts near Rome served by the projected line, and thus enable them to live out of the city, where house rents have of late years increased very much owing to the dearth of apartments consequent upon the demolitions ordered by the municipal authorities and the increase of population.

GERMANY.—The old mint at Friedrichstadt is to be restored under the direction of Professor Haupt.——A competition is to be held for designs for an Exhibition Hall in Frankfort, the premiums for which will amount to 36,000 marks.——The new bridge at Dresden—the "Augustus Bridge"—is to be built from designs by Herr Wilhelm Kreis; the work will be begun, on both sides of the Elbe simultaneously, in the autumn of this year.——The town of Kiel has voted the sum of 2,475,000 marks for the erection of a new Town Hall, to be designed by Professor Billing.

SWITZERLAND.—In the course of the instalment of a new organ in the Church at Pieterlen (Canton Bern), a tablet, dating from the XIVth century, and several frescoes of this and later periods, were discovered.——The expenses of the restoration of the Church of St. Francis, at Lausanne, amounted to 14,761 francs less than was estimated; the surplus is to be employed to supply stained glass windows, which are now being designed by Herr Heaton, of Neuchatel.

Miscellaneous.

PROFESSIONAL AND BUSINESS ANNOUNCEMENTS.—The business of Messrs. Alexander Boyd & Son, 105, New Bond-street, has been transferred to Messrs. O'Brien Thomas & Co. (range, stove, and sanitary goods merchants), and the original business of Messrs. Boyd & Son will be carried on as a branch of theirs, at 297, Oxford-street, under the management of Mr. R. W. Boyd.——Messrs. Davis & Bennett, sanitary and hot-water engineers, have taken into partnership Mr. Leslie E. Wilton, and the style of the firm will in future be "Davis, Bennett & Co."

HOUSE PROPERTY AND INVESTMENT COMPANY (LTD.).—The report for the twelve months ended March 31 sets forth that after providing 4,504*l.* for depreciation, and the payment of 2,341*l.* out of revenue for structural and sanitary repairs, the surplus amounts to 25,527*l.*, giving a total available balance of 27,283*l.* The net revenue (25,527*l.*) is 192*l.* less than that during the preceding period, which is stated to be satisfactory, regard being had to the unusual amount of unlet property in and around London, of which at present there is no sign of improvement. An interim dividend of 2 per cent. having been already paid, the directors recommend the payment of a final dividend of 2 per cent., making 4 per cent. for the year, leaving 1,359*l.* to be carried forward, and 500*l.* to be placed to the reserve which is thus increased to 42,000*l.*

TOWER BRIDGE.—In giving evidence before the Committee of the House of Commons respecting the Corporation of London (Blackfriars and other Bridges) Bill, Mr. Pollock, City Remembrancer, stated that under clause 64 the Corporation seek for powers to discontinue the use of the upper part of Tower Bridge. The Tower Bridge Act required that provision should be made in that form for crossing the bridge when the bascules were lifted, but as a matter of fact the upper bridge is not used on those occasions, since foot-passengers prefer to wait until the roadway is lowered. The Committee found the preamble of the Bill proved, upon the understanding that the upper footway of the bridge will be kept in working order so that it may be availed of in the event of any temporary failure of the machinery which operates the lower roadway.

QUEEN VICTORIA MEMORIAL.—In the House of Commons, on the 9th inst., Sir W. Collins asked the First Commissioner of Works what was the nature of the building operations which were now being carried on at Primrose-hill; whether the buildings to be erected were of a permanent or temporary character; and if he would undertake that the buildings in question should be so designed as not to interfere with the picturesque character of the neighbourhood.—Mr. Harcourt: About one-fifth of an acre has been railed off for a studio for Mr. Brock for his work on the Queen Victoria memorial; the temporary building will be removed when the work is completed. From my knowledge of the elevation I am satisfied that it is not likely to interfere with the surrounding scenery.

ST. LOUIS EXHIBITION.—The report of the Royal Commission which has just been issued contains a report, written by the secretary, Colonel Sir C. M. Watson, upon the transportation and installation of the collective exhibits of British Industries, and a description by Professor L. F. Vernon-Harcourt, British juror for Civil Engineering and Public Works, of the civil engineering exhibits which consisted mainly of models of maritime, dock, navigation, and irrigation works, with some exemplars of military architectural engineering works. Mr. H. H. S. Cunynghame, C.B., furnishes the report of the committee for mines and metallurgy, and Sir Boverton Redwood one upon chemical industries. The United States Government Bureau of Standards bought the complete plant of the exhibited apparatus for the liquefaction of hydrogen.

TRAMWAY AND RAILWAY BILLS IN PARLIAMENT.—The House of Commons Committee, of which Sir Lewis McIver is chairman, gave their decision last week upon the London County Council (Tramways and Improvements) and the Middlesex County Council (Tramways) Bills. The Committee found the preamble of the former Bill proved except in so far as it relates to the proposed tramway along Edgware-road from Marble Arch to Cricklewood. They have amended the London County Council's Bill by providing that the terminus of the tramway on Victoria-embankment must be at a point opposite John Carpenter-street pending the widening of Blackfriars Bridge, and that the Council shall widen the roadway of Westminster Bridge by throwing into it 2 ft. of the footway on each side before they carry the tramway over the bridge. They have, moreover, reduced from seven to five years the period for the construction of the over-bridge tramways, in order that the term may synchronise with that taken by the Corporation of the City for the widening of Blackfriars Bridge. As regards the North-East London Railway Bill, the Select Committee of the House of Commons on Unopposed Bills, Mr. Emmott being in the chair, have ordered to be reported for third reading a measure for conferring further powers in respect of the proposed construction of a railway from the Monument to Waltham Abbey. Sir Douglas Fox is engineer to the company, who seek to acquire additional land for a tube-station at Gresham House and to provide more rolling-stock in order to increase the service from a three to a two minutes' service, and to raise an additional capital of 333,000*l.* for those purposes. The Metropolitan District Railway Bill was passed through the Committee stage on May 8 by the House of Commons Private Bill Committee, presided over by Sir G. Doughty. The Bill relates to certain minor works and the construction of a subway from South Kensington Station, giving access to the Albert Hall. The Albert Hall Commissioners agreed, through their counsel, to the insertion in the Bill of a clause safeguarding their interests in respect of the subway.

STATUE OF THE LATE MR. W. E. H. LECKY, TRINITY COLLEGE, DUBLIN.—The statue erected to the memory of the late Mr. W. E. H. Lecky by the graduates of Trinity College and other admirers was unveiled on the 10th inst. by the Right Honourable Lord Rathmore. The commission for the work was given to Mr. W. Goscombe John, A.R.A., and the statue has been placed in the open space between the library and the examination hall. Cast in bronze, it stands on a pedestal of Irish limestone. It is more than life-size, and represents Mr. Lecky seated in an arm-chair in an easy attitude, an open book lying on his knees, and his left arm resting on the arm of the chair.

PROPOSED COAST PROTECTION WORKS, BOURNEMOUTH.—The Bournemouth County Borough Council having made application for sanction to borrow 18,000*l.* for the purpose of constructing an undercliff drive and works of

cliff preservation and protection between the Bournemouth Pier and Meyrick-road, and 6,100*l.* for the purchase of certain properties known as "Elmhurst" and "Leyton Mount," for the purpose of a museum, etc., Mr. P. M. Crosthwaite, M.Inst.C.E., held, on behalf of the Local Government Board, an inquiry into the subject matter of such application at the Council Chamber on the 3rd inst. Mr. F. W. Lacey, M.Inst.C.E., the Borough Surveyor of Bournemouth, stated that during the seventeen years he had held his appointment he had watched and studied the condition of the cliffs and had found that they were wearing away through atmospheric influences. He described the scheme in question, submitting that there would not be any interference with the full enjoyment of recreation on the sands or with bathing, and the proposed drive would be well sheltered, being protected from the north winds which generally prevailed. In ordinary circumstances there would not be less than 50 ft. of sand between the sea and the drive, and it was only occasionally that the sea got as far as the foot of the cliffs. The area to be taken up by the drive would be on soft sand. It was proposed that the drive should be 35 ft. wide, and the promenade 20 ft. wide on the seaward side, with an elevation of 10 ft. above mean water mark. The toe of the wall would go down about 2 ft. below water mark, and the wall would be of a sloping character, two in one, with a flight of steps if required.

GLASGOW SCHOOL OF ARCHITECTURE.—An exhibition of drawings by students who attend at the School of Art and the Technical College the classes that jointly prepare for the diploma and certificate of the Glasgow School of Architecture will be on public view for a few days in the Exhibition Hall of the Technical College. The work comprises original designs for buildings, studies of classic examples pre-Christian and mediæval, measurements and sketches of actual examples—both local and as far afield as Oxford—and problems in constructional design. In all, over a thousand drawings are hung. The prize awards have been made by a jury comprised of Mr. Hippolyte J. Blanc, R.S.A.; Mr. T. L. Watson, F.R.I.B.A., one of the College Governors; Mr. David Barclay, F.R.I.B.A.; Mr. James Lindsay, A.R.I.B.A., representing the Glasgow Institute of Architects and the professors of the School and College. The maintenance scholarship of 20*l.* has been gained for the second time by Edward G. Wylie, a day studentship of 15*l.* falls to Wm. Jas. Anderson, travelling scholarships of 10*l.* to William Lindsay and W. Alexander Robb, and the Glasgow Institute of Architects' prize to Thos. C. C. Mackie.—*Glasgow Herald.*

LONDON SQUARES AND ENCLOSURES BILL.—In the House of Lords on Tuesday, on the order for the second reading of this Bill, the Earl of Wemyss moved that the second reading of the Bill, which, he said, embodied a very dangerous and important principle, be postponed for a week. The Bill was proposed by the London County Council to prohibit or restrict the erection of buildings or structures on certain lands in the Administrative County of London, and, as far as he could make out, there was no compensation or purchase proposed. That was a very dangerous principle. The Earl of Onslow mentioned that this Bill was before the House last Session, when it was thrown out by the Committee to whom it was referred. It had been put down for second reading on several occasions, and had been postponed from time to time, so that the noble earl had had ample opportunity of taking objection to it. He would venture to point out that it was not usual to challenge a Bill of this kind on the motion for the second reading. There would be ample opportunities for doing this at subsequent stages. The Earl of Wemyss said he should call attention to the Bill later on, and, meantime, he should strongly advise their lordships to look carefully into the far-reaching principle embodied in it. The motion for postponement was not pressed, and the Bill was read a second time.

Legal.

DISTRICT COUNCIL'S REJECTED AWARD.

THE case of the King *v.* the Colwyn Bay Urban District Council (*ex parte* Ward) came before a Divisional Court of King's Bench, composed of Justices Darling and Channell, on the 12th inst.

Mr. Macmorran, K.C. (with him Mr. C. C. Hutchinson), said he had to show cause against a rule for a mandamus calling on the Council to show cause why they should not take up an award which had been made in the dispute between them and Mrs. Ward. Under an Act of 1902 the Colwyn Bay authority had power to construct certain promenades and similar works in their district, and it was provided that if in doing so any damage was done to property they should pay for it. The Council, in pursuance of their powers, altered the level of an existing street, and, it was alleged, thereby injuriously affected access to the land of Mrs. Ward, and in other ways injured her property. She made a claim for compensation amounting to 300*l.*, and arbitrators were appointed on each side. They disagreed, and an umpire was called in under the Public Health Act. He had made his award, and the Council refused to take it up. The learned counsel argued that, though they would have been compelled to take it up had these proceedings been under the Lands Clauses Act, there was nothing to compel them to do so under the Public Health Act.

Mr. F. E. Smith, on behalf of the applicant, argued that the arbitration was under the Lands Clauses Act. He said that what was done was that the level of the road in front of Mrs. Ward's house was raised. It was a main work and not a subsidiary work, and therefore it came under the Lands Clauses Act.

Their lordships held that there was nothing inconsistent with the Colwyn Bay Act to say that the Lands Clauses Act applied in connexion with work carried out under it, and therefore made the rule absolute for the Council to take up the award with costs.

Order accordingly.

ACTION AGAINST BUILDERS BY SUB-CONTRACTORS.

THE hearing of the case of Geary, Walker, & Co., Ltd. *v.* Lawrence & Son concluded in the Court of Appeal before Lords Justices Vaughan Williams, Stirling, and Moulton on the 11th inst. on the defendants' appeal from a judgment of Mr. Justice Kennedy, sitting without a jury in the King's Bench Division.

Mr. G. A. Scott appeared for the appellants, and Mr. J. Eldon Bankes, K.C., and Mr. Lewis Thomas for the respondents.

Mr. Scott, in opening the case, said the action was brought by the plaintiffs, wood flooring contractors, of No. 11, Queen Victoria-street, E.C., against the defendants, Messrs. Walter Lawrence & Son, of Waltham Cross, a firm of builders, to recover a balance alleged to be due under a building contract, the defendants being the main contractors and the plaintiffs the sub-contractors. The question the learned judge had to decide was, whether on May 12, 1904, the sub-contractors were entitled to sue the main contractors for the balance of their account. On that date the plaintiffs issued their writ claiming 106*l.* 2*s.* The case for the defendants was that the plaintiffs had commenced their action prematurely. Defendants said that they were entitled to hold the balance until all the work was approved by the architect.

Lord Justice Moulton said he understood the point was, whether the action was ripe at the date of issuing the writ.

Mr. Scott said that that was so. Although the amount sued for was comparatively small, the case raised a question of great importance with reference to building contracts. The learned counsel went on to state that the defendants on January 23, 1902, entered into a contract with the Edmonton Urban District Council to erect swimming baths, a Council Chamber, Council offices, etc., the contract price working out at something between 30,000*l.* and 40,000*l.* Defendants agreed with the plaintiffs to do the wood flooring, etc., for 1,058*l.* Of this 952*l.* had been paid, and the action was brought to recover the balance. The contract between the plaintiffs and the defendants was dated March 11, 1903. Under that contract the plaintiffs, the sub-contractors, agreed that the work should be done and the materials supplied to the satisfaction of the architect, Mr. W. G. Scott, and that they would maintain it for a certain period. Defendants further said that under their own contract with the Edmonton authority they only received 80 per cent. of the amount due for work done until a certain period, and that the plaintiffs were subject to the same terms as to money being retained as security for the work being properly done. Mr. Justice Kennedy held that the retention clause did not apply to the plaintiffs, and gave judgment for them for 88*l.* 19*s.* The learned counsel submitted that at the time the plaintiffs issued their writ the money was not due under the contract and that therefore the decision of Mr. Justice Kennedy was wrong. The material clauses in the main contract between the Edmonton authority and the defendants were as follows:—Clause 20: "All specialists, merchants, tradesmen, or others executing any work or supplying any goods for which prime-cost prices or provisional sums are included in the specification, who may at any time be nominated, selected, or approved by the architect, are hereby declared to be sub-contractors employed by the contractor; but no such sub-contractor shall be employed upon the works against whom the contractor shall make what the architect considers reasonable objection, or who will not enter into a contract with the contractor upon terms and conditions consistent with those in this contract and securing the due performance and maintenance of the work supplied or executed by such sub-contractor and indemnifying the contractor against any claims arising out of the misuse by the sub-contractor or his workmen of any scaffold erected or plant employed by the contractor, or that may be made against the contractor in consequence of any act, omission, or default of the sub-contractor, his servants, or agents, and against any liability under the Workmen's Compensation Act, 1897, or any amendment thereof." Clause 30 ran:—"The contractor shall be entitled under the certificates to be issued by the architect to the contractor, and within fourteen days of the date of each certificate, to payment by the employer from time to time by instalments when in the opinion of the architect work to the value of 500*l.* (or less at the reasonable discretion of the architect) has been executed in accordance with the contract, at the rate of 80 per cent. of the value of work so executed in the building until the balance retained in hand amounts to the sum of 2,000*l.*, after which time the instalments shall be up to the full value of the work subsequently executed. The contractor shall be entitled under the certificate to be issued by the architect to receive payment of 1,500*l.*, being a part of the said sum of 2,000*l.*, when the works are practically completed, and in like manner to payment of a further sum of 300*l.* within a further period of three months or as soon after the expiration of such period of three months as the works shall have been finally completed and in like manner to payment of the balance of 200*l.* within a period of twelve months from final completion and after all defects made good according to the true intent and meaning hereof. The architect shall issue his certificates in accordance with this clause. No certificate of the architect shall be considered conclusive evidence as to the sufficiency of any work or materials to which it relates nor shall it relieve the contractor from his liability to make good all defects as provided by this agreement. The contractor when applying for a certificate shall, if required, as far as practicable, furnish to the architect an approximate statement of the work executed, based on the original estimate." The contract of March 16, 1903, was as follows:—"We, the undersigned, Messrs. Geary, Walker, & Co., Ltd., of 11, Queen Victoria-street, E.C., hereby agree and undertake to carry out all mosaic and other work at the Town Hall, Baths, and Council Chamber Buildings, Lower Edmonton, for Walter Lawrence & Son, of Canal Works, Waltham Cross, and to the architect's entire satisfaction, orders for which have been or will be sent us from time to time by the said Walter Lawrence & Son, the work to be carried out as and when required by them; we further agree that no claim shall be made by us for any extras of any kind, unless the same have been ordered in writing by the said Walter Lawrence & Son, and that we will maintain in proper working order the whole of the work executed by us until the expiration of the time for which the said Walter Lawrence & Son are bound by their employers under their contract dated January 23, 1902, and we will also indemnify them against any loss upon any question which may arise under clause 20 of the conditions of the contract above-mentioned, and the terms of payment for the work in question shall be exactly the same as those set forth in clause 30 of the said conditions of contract above referred to; and in fact we are willing and hereby agree to be bound in every respect by the whole of the terms, clauses, and conditions as set forth in the contract dated January 23, 1902."

Mr. Eldon Bankes and Mr. Lewis Thomas having supported the judgment of Mr. Justice Kennedy,

Lord Justice Vaughan Williams, in giving judgment, said that, having regard to the documentary evidence, the Court must assume that the parties knew the course of business qualified to the extent that Mr. Walker in his evidence stated that he did not know the details of the retention scheme in the original contract between the defendants and the Edmonton authority. With that exception they must assume that both parties knew the course of business and what certificates were being given. It seemed to his lordship that the intervening certificates of the architect did not on the face of them say that any particular work was included in the amount certified for, and in these circumstances the onus lay on the plaintiffs to show that the certificates did in fact include the work in question. He thought the proper way to construe the document of March 16, 1903, was to read the contract by applying *mutatis mutandis* clauses 20 and 30 of the main contract between the contractors and the local authority. He thought the plaintiffs had failed to make out that they were entitled at the time they brought the action to succeed in recovering the balance of their account, and on these grounds he was of opinion that the judgment of Mr. Justice Kennedy should be set aside.

Lord Justice Stirling said he always regretted to find himself differing from Mr. Justice Kennedy, but he came to the conclusion that his judgment could not be upheld. He agreed that *primâ facie* the covering letter of March 16, 1903, ought to be treated as introducing a new term into the contract which was accepted by the defendants by their making no objection; but as neither side desired in any way to rely upon the letter, it was far better, he thought, that their judgment should not rest upon that, and he was quite content to proceed upon the formal contract of March 16, 1903. The question turned upon these

words: "And the terms of payment for the work in question shall be exactly the same as those set forth in clause 30 of the said conditions of contract above mentioned." It had been said that it was impossible to give effect to that stipulation. His lordship was not persuaded of that. What were the terms of payment as they appeared from clause 30 of the contract? First, that the contractor, meaning there the main contractor, was to be entitled under the certificates to be issued by the architect to him to payment by the employer by instalments at the rate of 80 per cent. of the value of work so executed in the building until the balance retained in hand amounted to 2,000*l.*, after which time the instalments were to be up to the full value of the work subsequently executed. The contract of which clause 30 was a part was a contract to erect buildings at a cost of, speaking in round figures, about 28,000*l.*, and 2,000*l.* was to be the fund which was to be kept in hand by the employer by means of deductions from the amounts which appeared by the architect's certificates to be due. The sub-contract with which they had to deal was in comparison a very small contract. The whole sum which was to be received in payment was somewhere about 1,000*l.*, and obviously therefore literally the 2,000*l.* (if that was read as being part of the contract) would make it impossible to work; but what the document of March 16, 1903, said was not that clause 30 was to be read in its very language into that document, but that the terms of payment for the work were to be exactly the same as in that document. One of the terms of clause 30 was that a sum of 2,000*l.* of 28,000*l.* was to be retained. It seemed to his lordship that the exactly similar term would be that a like proportion of the 1,000*l.* should be kept in hand and that the sub-contractor should from time to time receive from the main contractor 80 per cent. up to the time when the sum bearing the same proportion as the 2,000*l.* bore to the 28,000*l.* had been accumulated, and after the full payment. Then that being the term as to the payment of the instalments, the clause contained a provision as to how the 2,000*l.* which was to be kept in hand was to be dealt with. It provided that the contractor should be entitled, under the certificate to be issued by the architect, to receive a payment of 1,500*l.*, being a part of the 2,000*l.* when the works were practically completed, and in like manner to payments of a further sum of 300*l.* within a further period of three months or as soon after the expiration of such period of three months as the works had been finally completed, and in like manner to payment of the balance of 200*l.*, within the period of twelve months from final completion and all defects were made good according to the true intent and meaning thereof. Having got over the difficulty as to the 2,000*l.*, it seemed to him that there was no difficulty in saying that the stipulation that the terms for the payment of the retention money should be dealt with in a similar manner; that the fund kept in hand should be divided into three parts, one of which bore the same proportion to the total retention money as the 1,500*l.* did to the 2,000*l.*; then the second part which would be dealt with would be a sum which bore the same proportion to the total amount of the retention money under the sub-contract as 300*l.* to the 2,000*l.*, and then there would be the ultimate balance a certained. So far it seemed to him that effect could be given to the contract, but then there followed the stipulation which had created a considerable amount of difficulty to him, because there was a positive stipulation that the architect would issue his certificate in accordance with that clause. Then, prior to the contract of March 16, 1903, the architect had positively declined to issue certificates to any sub-contractor under the main contract; and it did seem to his lordship a difficulty which had to be met as to what the effect of that was on the stipulation. He thought that both parties must have been aware of the course of business. In fact Mr. Walker, who was called, really admitted that, although he did not admit that he knew the details as to the distribution of the retention money. It seemed to him that the proper way to read the clause in that case was to treat them as being satisfied to deal with the certificates in accordance with which payments were to be made as being those which were to be issued by the architect to the main contractor, and not to treat this clause as introducing a separate bargain for separate certificates between the main contractor and the sub-contractor. That being so, if that was the true construction of the clause, it seemed to him that the plaintiffs failed to make out that they were entitled at the time when they brought the action to succeed in recovering the balance. That appeared to his lordship to be borne out by the whole course of dealing between the parties subsequently. The sub-contractor never made any objection to the deductions in fact being made at the time. They did not amount, it was true, excepting in the first place, to 20 per cent.; but 10 per cent. was always retained. Both parties were perfectly satisfied with that, and, of course, it was competent for the main contractor to waive his strict rights. No difficulty arose until the final application was made for the payment of the balance, the delay in which was caused, as it seemed to him, by the delay on the part of the architect in giving to the main contractor a certificate which entitled him to any portion of the 2,000*l.* which was outstanding. He thought it was plain, therefore, that the plaintiffs failed to make out their case, that they were entitled to payment of the balance at the time they brought the action. On these grounds he was of opinion that the judgment of Mr. Justice Kennedy should be reversed.

Lord Justice Moulton gave judgment to the same effect, and the appeal was accordingly allowed, with costs, both in that Court and in the Court below.

THE ACTION AGAINST THE WARBLINGTON URBAN DISTRICT COUNCIL.

MR. JUSTICE WALTON, in the King's Bench Division, on the 14th inst., concluded the further hearing of the case of Foster *v.* the Urban District Council of Warblington, in order to assess the damages the plaintiff was entitled to from the defendants.

The plaintiff, Mr. J. D. Foster, the owner of an oyster business at Emsworth, near Chichester, brought the action for an injunction to restrain the defendants from placing or maintaining their sewer outfalls near the plaintiff's oyster storage beds on the foreshore of Emsworth Creek, and from delivering sewage on the foreshore in the neighbourhood of the beds so as to contaminate the same and to render the oysters unsafe for human food. The plaintiff also claimed damages laid at 10,000*l.* for loss and injury to his business caused by the alleged nuisance. The defendants denied liability on various grounds, but Mr. Justice Walton held that the defendants had no prescriptive right to discharge sewage into the sea so as to contaminate the oysters in private oyster beds and gave judgment for the plaintiff for damages to be assessed. From this decision the defendants appealed, but the Court of Appeal affirmed the judgment of Mr. Justice Walton. The case now came on again before his lordship in order to ascertain the damages to which the plaintiff was entitled.

In the result his lordship awarded the plaintiff 850*l.* damages, the plaintiff to have the costs of the former hearing, but each party to bear their own costs of the present hearing.

Mr. W. Willis and Mr. J. G. Pease appeared for the plaintiff; and Mr. Hohler and Mr. Pitman for the defendants.

THE LONDON BUILDING ACT.

MESSRS. HENRY SMITH & SON, builders, of South Kensington, were summoned, at the Thames Police court recently, for contravening the Building Act by erecting a large wooden screen at the rear of houses in Vauxhall-bridge-road without the permission of the London County Council.

The screen was erected, at a cost of 120*l.*, with a view of preserving the right of ancient lights. The owners would not allow the builders to remove the screen after notice from the District Surveyor, and counsel on their behalf stated that the application and plans for approval were twenty-four days at the London County Council offices before a reply was sent. This delay occasioned expense, time being an element of importance.

Mr. Paul Taylor supposed that the London County Council had such an enormous amount of work that a reply could not be expected sooner. There was such a large amount of machinery to be set in motion—he would not say red tape.

On behalf of the defendants it was said that they were ready to accept any reasonable suggestion, but any sort of structure was objected to, the real reason being that the London County Council were intending shortly to apply to Parliament for more stringent powers over light and air spaces.

Mr. Large, the District Surveyor, said that a previous screen erected was blown down. He did not think anything of this sort would be permitted.

Mr. Paul Taylor made an order for the newly-erected screen to be removed within four weeks.—*Morning Advertiser.*

Patents of the Week.

APPLICATIONS PUBLISHED.*

10,952 of 1905.—E. RUCKGAUER: *Method and Means of Shifting or Removing and Turning Buildings.*

This relates to a method of shifting entire buildings, which consists in mounting in the base or foundation, and in front of the same, a supporting frame or stationary grating chiefly composed of a series of beams at right angles to the line of advance, inserting into the walls a movable upper frame, chiefly composed of a series of longitudinal beams arranged and shaped like the runners of a sledge, and of a main transverse beam placed across the rear ends of the longitudinal beams, mounting behind the building a propelling mechanism adapted to press uniformly on numerous points of the width of the upper frame, detaching the building from the masonry foundation, operating the said propelling mechanism up to the end of its stroke, re-adjusting the propelling mechanism again operating, and re-adjusting the same alternately, and periodically extending the stationary grating in proportion as the work advances.

11,125 of 1905.—G. J. WILLIAMS: *Casement Stays or Fasteners and Opening and Closing Apparatus.*

This relates to casement stays or fasteners, and consists essentially in the employment in combination of a cylindrical bracket secured to the casement, an operating screw carrying a ball located in said bracket and operating in a horizontal slot therein, a vertically pivoted nut on the casement frame, and a knob for rotating the aforesaid screw.

12,502 of 1905.—J. S. PULLAN and W. H. MANN: *Machines for Moulding Facing Tiles.*

This relates to a power machine for moulding facing tiles comprising in combination a press frame provided with a driven crank shaft adapted to operate an upper ram through the medium of toggle levers or cams, a table formed with a mould beneath the upper ram, a reciprocating feed-box on the table adapted to deliver the powdered substance into the mould, a lower ram, consisting of two elastically-connected members adapted to slide vertically on fixed guides, and carried on a strong, spiral spring located in a base box on the bed of the press frame, internal spindles situated within the lower ram adapted to form undercuts or depressions in the tile, and a double-headed rocking lever in connexion with the lower ram, operated, through the medium of a two-part elastically-operated rod, by a cam on the crank shaft of the press.

7,752 of 1905.—A. B. C. DANKS: *Hermetically Sealed Doors of Cylinders and Chambers used for Creosoting or Vulcanising Vacuum Pans and Brick Hardening Chambers for High-Pressure, and the like purposes.*

This relates to doors which are sealed and secured by screw applied radiating arms engaging with slots or staples in a cylinder or chamber, and is characterised by a wrought and dished door having an encircling ring, the shoulders of which are provided with a recess containing soft metal, or other suitable packing, in combination with cam-shaped ends to the radial arms, which operate directly upon the ring, and thereby force the packing on to the chisel-edged projection on the shoulder of the cylinder.

8,285 of 1905.—DR. B. BRUHN: *A Process for the Preliminary Treatment of Blast Furnace Slag for the Production of Cementitious Material.*

This relates to a process for the treatment of blast furnace slags or other silicate mixtures for the manufacture of cementitious materials, in which the silicate mixtures are used in a molten state immediately after their burning or melting process with a small per cent. of alkalies or alkaline salts, and are then granulated and ground to a proper grade.

14,576 of 1905.—E. J. PROPPER and F. BACHSCHMID: *Blocks or Tiles for Covering Floors, Walls and Ceilings.*

This relates to blocks for covering floors, walls and ceilings, and consists of cross-shaped wooden tablets, the arms of which are rectangular, and have their angles or inner corners formed with rib-shaped projections, and the outer corners or edges of their end faces formed with corresponding grooves.

16,863 of 1905.—W. T. HARRISON: *Flooring Tiles and Surfaces.*

This relates to an elastic-faced flooring tile having an earthenware or hard grooved base and an applied rubber face consisting of two layers of varying elasticity, the base rubber being harder than the treading face so as to obtain a better effect.

17,015 of 1905.—H. OSBORNE: *Operation Devices for Hinged Fanlights or Windows.*

This relates to an operating device for hinged fanlights or windows, and consists of a transom lifter of the kind comprising a worm, means for piling the worm, and a worm wheel having on its shaft a lever for operative engagement with the transom, the provision of coil springs encircling the worm wheel shaft at opposite sides of the worm wheel, having the extremities of each engaged with the supporting fixture, and having their free extremities arranged in opposition, and a bar engaged with said free ends of the springs, and intermediately engaging the toothed edge of the worm wheel.

17,057 of 1905.—J. A. SHEPHERD: *Waterproofing Composition.*

This relates to a chemical proofing apparatus for treating fabrics to render them water-proof, made up of jelly soap, gum, tragasol, wax and water.

PATENTS.—*Continued on page 570.*

* All these applications are in the stage in which opposition to the grant of Patents upon them can be made.

List of Competitions, Contracts, etc.

For some Contracts still open, but not included in this List, see previous issues. Those with an asterisk (*) are advertised in this Number: Competitions, iv.; Contracts, iv. vi. viii. x.; Public Appointments, xvi.; Auction Sales, xxvi.

Certain conditions, beyond those given in the following information, are imposed in some cases, such as: the advertisers do not bind themselves to accept the lowest or any tender; that a fair wages clause shall be observed; that no allowance will be made for tenders; and that deposits are returned on receipt of a bonâ-fide tender unless stated to the contrary.

Competition.

* JULY 4.—**Warblington.**—SEWERAGE WORK—The Warblington U.D.C. invite schemes (with plans, specifications, and estimates) for main sewerage and sewage-disposal works for the parish of Warblington (including the town of Emsworth, Hants). Premium of 100*l.* is offered for the scheme and estimate selected as first, if approved by the Local Government Board. In the event of the scheme being carried out the premium will form part of the engineer's commission; 50*l.* is also offered for the scheme selected as second. Schemes, plans, specifications, and estimates to be addressed to the Clerk, Council Offices, Queen-street, Emsworth, not later than July 4.

Contracts.

BUILDING.

MAY 18.—**Manchester.**—OFFICE BUILDING.—A new office building and alterations to adjoining property in Major-street, Manchester. Name and address to Messrs. J. H. Burton & J. A. Percival, architects and surveyors, 150a, Stamford-street, Ashton-under-Lyne, not later than May 18.

MAY 18.—**Newport**—PARISH ROOM.—For erection of parish room, Newport, Salop. Apply to Mr. Oswell, architect, Dane-chambers, Shrewsbury, not later than May 18. Quantities will be supplied on payment of 1*l.* 1s. Plans will be deposited with the Rev. W. Budgen, Newport Rectory.

MAY 19.—**Nottingham**.—WALL.—Nottingham Improvement Committee invite tenders for the erection of a brick retaining wall at the junction of London-road and Station-street. Drawings may be seen, and copy of the specification, bill of quantities, and form of tender may be obtained, on applying to Mr. Arthur Brown, M.Inst.C.E., City Engineer, Guildhall, on payment of a deposit of 1*l.* 1s. Sealed tenders, endorsed "Wall, Junction of London-road and Station-street," are to be delivered to Mr. Samuel G. Johnson, Town Clerk, Guildhall, Nottingham, on or before May 19.

MAY 19.—**Warley.**—SCHOOL.—Oldbury Urban District Education Committee invite tender for the erection of an infant school at Castle-road, Warley, to accommodate about 260 children. Particulars can be obtained on payment of 1*l.* deposit. Applications to be sent in on or before May 19. Mr. Sidney Vernon, Secretary, Public-buildings, Oldbury.

MAY 20.—**Ballymecashon.**—MANSE.—The erection of a manse for the R.P. Church, Ballymecashon, Killinchy. Plans and specifications may be had at office of Mr. James Scott, B.E., civil engineer and architect, Ocean-buildings, Belfast. Sealed tenders to be lodged not later than May 20

* MAY 20.—**Crewe.**—SCHOOLS.—The Crewe Education Committee invite tenders for schools off Earle-street for 1,525 children. Names to be sent, with deposit of 2*l.* 2s., to Mr. H. D. Struthers, Director of Education, Municipal-buildings, Crewe, before May 20. Quantities and other information will be supplied by the architect to those tendering.

MAY 21.—**Batley.**—HOUSES.—The erection of two houses and boundary walls, in Deighton-lane, Batley. Plans and specifications may be seen, and bills of quantities obtained, at office of Mr. John H. Brearley, architect, Commercial-street, Batley, from Monday, May 14 to 21, on which latter date sealed and endorsed tenders are to be sent in.

MAY 21.—**Byfleet.**—HOUSE AND PREMISES.—For the erection of a house and premises to be built in Church-road, Byfleet, Surrey, for Mr. Arthur Sharp. The plans, elevations, sections, details, and specifications can be seen at office of Mr. D. G. Andrew, architect, Bridge-road, East Molesey. Tenders to be sent by post or delivered by 8 p.m., May 21, marked "Tender for House."

MAY 21.—**Fochabers.**—DWELLING-HOUSE.—Mason, carpenter, slater, plaster, plumber, and painter work of new dwelling-house and offices, to be erected at Fochabers, Gordon-Richmond Estates. Plans and specifications may be seen at the Estates office, Fochabers, and tenders will be received by Mr. D. J. Cunningham, Factor, up to 2 o'clock, on May 21.

MAY 21.—**Hinckley.**—SCHOOLS.—The erection of science buildings at the grammar school, Hinckley, for the Governors of the Schools. Conditions of contract, quantities, and form of tender may be obtained, and plans inspected, upon application to the architects, Messrs. Barrowcliff & Allcock, Town Hall-chambers, Loughborough, on payment of a sum of 1*l.* 1s. Sealed tenders, upon the forms supplied, to be delivered at office of Messrs. S. & S. H. Pilgrim, Solicitors to the Governors, Hinckley, not later than 11 a.m., May 21 endorsed, "Grammar School Extension." The successful contractor will be required to find two securities in one sum amounting to 20 per cent. of the total amount of the contract.

MAY 21.—**Ralia.**—VILLA—Mason, carpenter, slater, plumber, plasterer, painter, and glazier works of new villa at Ralia, neaf Newtonmore. Plans and specifications may be seen with the architect, Mr. Alexander Mackenzie C.E., Kingussie, who will receive offers up to May 21.

MAY 22.—**Halifax.**—REPAIRING ROOF.—The Improvement Committee of the Halifax Corporation invite tenders for repairing roof, etc., at Messrs. Holmes' Foundry, Booth Fold. Quantities and forms of tender may be obtained on application to Mr. James Lord, M.Inst.C.E., Borough Engineer, Town Hall, Halifax, upon payment of the sum of 1*l.* Tenders, endorsed "Roof, Booth Fold," must be sent to Mr. Keighley Walton, Town Clerk, not later than 12 o'clock noon on May 22.

MAY 22.—**Hull.**—STABLES.—North-Eastern Railway Directors invite tenders for rebuilding of horse stables, Waverley-street, Hull. Plans and specification may be seen, and quantities and further information obtained, upon application to Mr. William Bell, the Company's architect, at York. Duplicate plans may also be seen upon application to the Clerk of Works' office, Paragon Station, Hull. Quantities supplied on personal application to parties tendering for the whole of the works. Sealed tenders, marked "Stables, Waverley-street, Hull," to be sent to the Secretary, at York, not later than noon on May 22.

MAY 22.—**Newcastle.**—CONVERTING BUILDINGS INTO OFFICES.—North-Eastern Railway Directors invite tenders for converting old business premises at New Bridge-street, Newcastle, into offices and stores. Plans and specification may be seen, and further information obtained, upon application to Mr. William Bell, the Company's architect, Central Station, Newcastle-on-Tyne. Contractors will be required to take their own quantities. Sealed tenders, marked "Offices, New Bridge-street, Newcastle," to be sent to the Secretary, at York, not later than noon on May 22.

MAY 23.—**Aquhorsk.**—RESTORATION OF DWELLING HOUSE.—The mason, carpenter, slater, and plaster works of restoration of dwelling-house at Aquhorsk, Kinellar, Glascoforest Estate. Mr. William Ogg, ground officer, Glascoforest, will show plans and specifications; and Messrs. Chalmers, advocates, 18, Golden-square, Aberdeen, will receive offers up to May 23.

MAY 23.—**Cardiff.**—PUMPING STATION.—Cardiff Corporation invite tenders for the erection of a pumping station and chimney stack at Penarth-road, for Western District Sewer, Contract No. 7. Plans, specification, and conditions of contract may be seen, and bills of quantities obtained, at the office of Mr. W. Harpur, M.Inst.C.E., City Engineer, Cardiff, upon deposit of 3*l.* Tenders, on the prescribed form, and accompanied by the bills of quantities under separate cover, sealed, and endorsed "Tender for Pumping Station, Penarth-road," to be delivered at office of Mr. J. L. Wheatley, Town Clerk, Town Hall, Cardiff, on or before May 23.

MAY 23.—**Carlisle.**—WESLEYAN CHURCH.—The erection of proposed new Wesleyan church in Lowther-street, Carlisle. Names to Messrs. Johnstone Bros., architects and surveyors, 39, Lowther-street, Carlisle, before May 23, together with a deposit of 10s. 6d.

MAY 23.—**Evesham.**—FACTORY.—For erection of a jam factory in Evesham for Messrs. T. W. Beach & Sons, Ltd. Names and addresses to the architect, Mr. F. Foster, Masonic-buildings, Coventry, on or before May 23.

MAY 23.—**Kilcoleman.**—RESLATING ROOF—For reslating the roof and executing other improvements at Kilcoleman, Desert, Co. Cork, for Capt. J. E. Longfield, J.P., in accordance with plans and specification prepared by Messrs. W. H. Hill & Son, architects, 28, South-mall, Cork, with whom tenders are to be lodged on or before May 23.

MAY 23.—**Larne.**—SCHOOL.—Building additions and alterations to the Larne Grammar School. Plans, specification, and conditions of contract can be seen at office of Mr. William J. Fennell, architect, 2, Wellington-place, Belfast. Bills of quantities can be obtained from Mr. W. J. M'Carthy, surveyor, Scottish Provident-buildings, Belfast. Tenders to be sent to the Rev. J. Kennedy, Larne, on or before May 23.

MAY 23.—**Mirfield.**—HOUSES AND SHOPS.—The erection of two houses and shops at Legard Bridge, Mirfield. The drawings and specifications may be seen, and bills of quantities obtained, at Dewsbury offices of Messrs. John Kirk & Sons, architects, Huddersfield and Dewsbury, from May 16 to May 23, on which latter day tenders are to be delivered at Dewsbury before 3 o'clock p.m., free of charge.

MAY 23.—**Netherton.**—ADDITIONS TO HOUSE.—Carpenter, slater, and plaster works of additions to dwelling-house, Netherton (Mrs. Fraser), Glascoforest Estate. The plans and specifications may be seen in the hands of Mr. William Ogg, ground officer. Offers will be received by Messrs. Chalmers, advocates, 18, Golden-square, Aberdeen, up to May 23.

MAY 23.—**Strata Florida.**—HOUSE.—The erection of a house at Ffair-rhos, near Strata Florida, for Messrs. Thomas W. Ward, Ltd. Plans and specification may be seen on application to Capt. J. Williams, Pretoria House, Pontrhydfendigaid, or to the architect. Tenders should be sealed and endorsed, and delivered to the architect, Mr. G. T. Bassett, A.R.I.B.A., architect and surveyor, Aberystwyth, by May 23.

* MAY 24.—**Maldon.**—SCHOOL, ETC.—The Essex Education Committee invite tenders for new secondary school and pupil teachers' centre shortly to be erected at Maldon. Names to the architect, Mr. P. M. Beaumont, High-street, Maldon, on or before May 24.

MAY 24.—**Slaithwaite.**—RESIDENCE, WAREHOUSE, ETC.—The erection of a residence, warehouse, etc., in Union-street, Slaithwaite. Plans may be seen, and quantities obtained, at office of Mr. Arthur Shaw, architect, Golcar, from May 17 to May 24, on which later date sealed and endorsed tenders must be delivered not later than 6.30 p.m.

MAY 25.—**Barrow-in-Furness.**—HOUSES.—Tenders are invited for the erection of fourteen houses in Thwaite-street and Brewery-street, Barrow-in-Furness, for the Barrow Co-operative Society, Ltd. Bills of quantities may be obtained at the office of the architect, Mr. Henry T. Fowler, A.R.I.B.A., 6, Cornwallis-street, Barrow. Tenders to be forwarded to Mr. James Clarkson, Barrow Co-operative Society, Ltd., Abbey-road, not later than 12 o'clock noon on May 25.

MAY 25.—**Llwydcoed.**—VILLA RESIDENCE.—The erection of a villa residence at Llwydcoed, Aberdare, for Mr. W. M. Jones. Plans and specification may be seen, and bills of quantities obtained, on deposit of 1*l.* 1s. at office of Mr. J. Llewellin Smith, architect, Aberdare. Sealed, endorsed tenders to be sent to Mr. W. M. Jones, 2, Victoria-square, Aberdare, not later than May 25.

MAY 25.—**Navan.**—COTTAGES.—Navan U.D.C. invite tenders for erecting fourteen two-story cottages on the Kells-road, Navan, in accordance with plans and specification prepared by Mr. R. Barnes, A.M.Inst.C.E.S., which may be inspected at Trimgate-street, Navan. Copies of specification, bill of quantities, and form of tender are to be had from Mr. James Lawler, Clerk of the Council, Council Offices, Navan, Co. Meath, on payment of 1*l.* Sealed tenders, covering priced bill of quantities, are to be endorsed "Tender for Cottages," addressed to the Chairman of the Council, and delivered to the Clerk of the Council, not later than 12 o'clock, noon, on May 25.

* MAY 25.—**Palmer's Green.**—SORTING OFFICE.—For the erection of sorting office at Palmer's Green for H.M. Office of Works. Drawings, specifications, form of contract, etc., can be seen on application to Mr. Wagner, H.M. Office of Works, Westminster, S.W. Bill of quantities and form of tender are also to be obtained at above address on deposit of 1*l.* 1s. Tenders, endorsed "Tender for Palmer's Green Sorting Office," and addressed to the Secretary, to be delivered at H.M. Office of Works, Storey's Gate, S.W., before 12 o'clock noon on May 25.

MAY 26.—**Chingford.**—IRON SCHOOL BUILDING.—Essex Education Committee (Epping Local Advisory Sub-Committee) invite tenders and specifications for the erection and completion of a temporary iron school building to accommodate 200 children, with necessary out offices, at Chingford, Essex. Proposed plan of buildings can be seen, and form of tender obtained, at the offices of the architect, Mr. Frank Whitmore, Chelmsford. Sealed tenders, endorsed "Tender for Temporary Iron School, Chingford," to be sent not later than May 26 to Mr. J. Herbert Tee, Clerk to the Committee, Office, Loughton, Essex.

MAY 28.—**Bolsover.**—SCHOOL.—Derbyshire Education Committee invite tenders for the erection of Old Bolsover School to accommodate about 640 children. Drawings, specification, agreement, etc., at the office of the Architect to the Committee, St. Mary's-gate, Derby, between the hours of 10 a.m. and 4 p.m., except on Saturday, when they will be on view from 10 a.m. to 12 noon. A copy of the bill of quantities, specification, conditions of contract, and form of tender can be obtained at the Architect's office upon payment of 1*l.* 1s. Sealed tenders, in envelopes provided for the purpose, and endorsed "Tender for New Council School, Old Bolsover," must be delivered to Mr. George H. Widdows, A.R.I.B.A., Architect to the Committee, County Education Offices, St. Mary's-gate, Derby, not later than 5 p.m. on May 28. The C.C. will require two approved sureties as security for the due and proper performance of the contract.

* MAY 29.—**Poplar.**—SCHOOL.—The L.C.C. invites tenders for erecting a school on the Janet-street site, West Ferry-road, Poplar E., for sixty mentally defective children. Drawings and specification may be seen, and bills of quantities, form of tender, and other particulars obtained, at the Education Offices (Architect's Department), Victoria-embankment, W.C., on payment of 3*l.* Tenders, in envelope provided, to be delivered at Education Offices (Room 148), Victoria-embankment, W.C., before 11 a.m., May 29.

MAY 29.—**Senghenydd.**—HOUSES.—The erection of sixty houses and road-making, etc., at Senghenydd, for Lewis Merthyr Consolidated Collieries, Ltd. Drawings and specification can be seen at office of Mr. John H. Phillips, F.R.I.B.A., Clive-chambers, Windsor-place, Cardiff, and sealed tenders, endorsed "Senghenydd," are to be delivered on or before May 29.

MAY 30.—**Abram.**—SCHOOL.—Lancashire Education Committee invite tenders for the erection of a new public elementary school at Lily-lane, Bryn Gates, Abram, near Leigh. The plans may be seen and bills of quantities obtained at the office of the County Architect, Mr. Henry Littler, 16, Ribbledale-place, Preston, by payment of a deposit of 2*l.* Tenders must be delivered before 12 o'clock noon on

May 30, sealed and endorsed, to Mr. W. Aspinall, Rockleigh, Ashton-in-Makerfield.

MAY 30.—**Colchester.**—SCHOOL.—Colchester Education Committee invite tenders for the erection of a school in Greenstead-road, to be known as the East Ward Council School. Plans and specifications may be seen, and bills of quantities obtained, of the architects, Messrs. Goodey & Cressall, Victoria-chambers, Colchester, on payment of a deposit of 5l. Tenders, under seal, must be on the form supplied, endorsed "Tender for School, East Ward, Colchester," and delivered at the offices of the Committee not later than 12 o'clock noon on May 30.

MAY 30.—**Durham.**—PREMISES.—For rebuilding premises at the rear of 61, Saddler-street, Durham. Plans and specifications may be seen, and quantities obtained, at Rushworth's Art Gallery. Sealed and endorsed sole tenders to be delivered to Messrs. Rushworth & Son not later than May 30.

MAY 31.—**Sudbury.**—HOSPITAL ADDITIONS.—The Committee of Management of St. Leonard's Hospital, Sudbury, invite tenders for the erection of additional accommodation, consisting of nurses' bedrooms, isolation ward, etc. Drawings, specification, and conditions may be seen at the office of the architect, Mr. Alfred Howard, Cornard-road, Sudbury. Tenders, which are to be sent in by May 31, should be sealed and endorsed "Tender for Additional Accommodation at St. Leonard's Hospital," and addressed to Mr. Joseph Alexander, Secretary of the St. Leonard's Hospital, Sudbury.

JUNE 1.—**Port Patrick.**—DWELLING-HOUSE.—The erection of a dwelling-house at Port Patrick, in the County of Wigtown. Copies of the bill of quantities will be supplied on application to the Superintending Engineer, H.M. Naval Establishment, Rosyth, Inverkeithing, N.B. The drawings, specification, and conditions of contract may also be seen there, and at Port Patrick Coastguard Station, and at the office of Director of Works Department, Admiralty, where tenders are to be delivered before noon on June 1.

JUNE 2.—**Leigh.**—SCHOOL.—Corporation of Leigh invite tenders for the erection of a new school in Windermere-road, Leigh. Names to the architects, Messrs. J. C. Prestwich & Son, Bradshawgate-chambers, Leigh. The drawings, general conditions, and specification may be inspected, and the bill of quantities, with the form of tender annexed, obtained at the office of the architects, on deposit of 1l. 1s. Tenders, on the form provided, addressed to the Chairman, School Buildings Committee, Town Hall, Leigh, and endorsed "Tender for Council School," must be sent to Mr. Stanley Wilson, Town Clerk, Town Hall, Leigh, before 12 o'clock on June 2.

JUNE 4.—**Kinloss and Findhorn.**—ALTERATIONS TO SCHOOLS.—The mason, carpenter, slater, plumber, plasterer, and painter works of alterations and additions at the schools of Kinloss and Findhorn. Plans and specifications may be seen with Mr. Peter Fulton, architect and surveyor, North of Scotland Bank Buildings, Forres, who will receive sealed tenders up to 10 a.m. on June 4.

* JUNE 11.—**Little Heath.**—SCHOOLS, ETC.—The Hertfordshire C.C. Education Committee invite tenders for new elementary school and teacher's residence at Little Heath. Drawings, specification, agreement, etc., can be seen at the County Surveyor's Office, Hatfield, on and after May 28, between 10 and 4 (Saturdays 10 and 12). A copy of schedule of works and prices (quantities), and form of tender can be obtained at County Surveyor's office on payment of 2l. 2s. Sealed tenders, endorsed "Tender for School and Teacher's Residence, Little Heath," to Mr. Urban A. Smith, County Surveyor, Hatfield, before 5 p.m., June 11.

* JUNE 12.—**Battersea.**—BOAT STORE.—The L.C.C. invites tenders for erection of a store-house for boats at Battersea Park, S.W. Drawings may be inspected, and specifications, bills of quantities, form of tender, and other particulars obtained, at the Architect's Department, 15, Pall-mall East, S.W., upon payment of 1l. Tenders to be delivered at the County Hall, Spring-gardens, S.W., and marked "Tenders for the Erection of a Boat-house at Battersea Park, S.W.," before 10 a.m., June 12.

JUNE 14.—**Antrim.**—COTTAGES.—Antrim R.D.C. invite tenders for the erection of labourers' cottages in the rural district, in accordance with plans and specifications, which can be seen at the office of the Clerk of the Council, or at the office of the architect, Mr. W. D. R. Taggart, Scottish Provident-buildings, Belfast, as follows:—One cottage at Killyfad, Randalstown, on the lands of Mr. John Fulton; one cottage at Annaghmore, Toomebridge, on the lands of Mr. B. O'Boyle; one cottage at Portlee, Toomebridge, on the lands of Mrs. M'Cann; one cottage at Portless, Toomebridge, on the lands of Mr. John O'Boyle; two cottages at Ballynamullen, Toomebridge, on the lands of Mr. Felix Laverty; one cottage at Tamnaderry, Randalstown, on the lands of Mr. James Gilbert; four cottages at Cranfield, Randalstown, on the lands of Mr. James Charleton; two cottages at Cranfield, Randalstown, on the lands of Mr. Bernard O'Kane; one cottage at Cranfield, Randalstown, on the lands of Mrs. Hume; two cottages at Feehogue, Randalstown, on the lands of Lord O'Neill; four cottages at Lurgan West, Randalstown, on the lands of Lord O'Neill; one cottage at Ballygrooby, Randalstown, on the lands of Mr. G. L. Young; two cottages at Craigmore, Randalstown, on the lands of Mr. J. H. Mulligan. Persons tendering may do so for any or all of the different blocks; but they must name the particular site or sites on their tender. Tenders are to be lodged with Mr. J. Clark, Clerk of Council, Union Office, Antrim, not later than 10 o'clock a.m. on June 14.

NO DATE.—**Bradford.**—VILLAS.—The joiners', plumber's, plasterer's, and slater's work necessary in the erection of a pair of semi-detached villas, Bolton-road, Bradford. Apply for quantities to Messrs. James Young & Co., architects, 62, Market-street, Bradford.

NO DATE.—**Hatfield.**—LAUNDRY.—Hatfield Guardians invite tenders for the erection of a new laundry at the Union Workhouse, Hatfield. Names to Messrs. Charles Smith & Son, architects, Reading, together with a deposit of 1l. 1s., when bills of quantities and other information will be supplied.

NO DATE.—**Kendal.**—ADDITIONS.—Re-modelling, building additions, new bathroom, etc., to house, No. 31, Lowther-street, Kendal, for Mr. Henry Hoggarth. Plans can now be inspected, and bills of quantities may be obtained, on application at office of Mr. John Hutton, M.R.S.I., architect, Kendal.

NO DATE.—**Langley Park.**—SCHOOL.—For new Wesleyan school, Langley Park, Co. Durham. Names and addresses to Mr. James W. Thompson, architect, 63, Grey-street, Newcastle-on-Tyne. Bills of quantities, prepared by Mr. Geo. Bell, will be forwarded, when ready, on receipt of a deposit of 1l. 1s.

NO DATE.—**North Wingfield.**—COTTAGE HOUSES.—Four cottage houses, at North Wingfield. May obtain quantities and see plans and specifications by applying to Mr. Tom S. Wilcockson, architect and surveyor, Knifesmith Gate, Chesterfield.

NO DATE.—**Roundhay.**—VILLA RESIDENCE.—The erection of a villa residence, Roundhay, for Mrs. C. R. Butler. Names and addresses to Mr. G. Fredk. Bowman, architect, 5, Greek-street, Leeds, when quantities will be forwarded in due course.

NO DATE.—**Sleaford.**—CHAPEL.—For Primitive Methodist chapel, assembly-hall, and schools, Sleaford. Names and addresses to Messrs. Herbert Walker & Son, architects, Nottingham and Sleaford.

NO DATE.—**South Kirby.**—HOUSES AND SHOPS.—For the several trades required in the erection of two houses and shops at South Kirby, near Wakefield. Names to Mr. W. E. Richardson, architect, Rothwell, near Leeds, when quantities will be forwarded.

ENGINEERING, IRON, AND STEEL.

MAY 21.—**Boat of Garten.**—WATER SUPPLY.—Cutting and filling pipe tracks, supplying and laying 4-in. and 3-in. cast-iron pipes, erecting reservoir and gathering wells, etc., of water supply to Boat of Garten village. Plans and specifications may be seen with, and schedules of quantities obtained from, Mr. James Gilbert, engineer, The Square, Grantown, and sealed offers, marked "Boat of Garten Water Supply," must be lodged with Mr. John Grant, Royal Bank, Grantown, on or before May 21.

MAY 21.—**Bucarest.**—WATER SUPPLY.—The Bucarest Municipality invites tenders for cast-iron pipes for water distribution, namely:—(1) Spigot and socket pipes in the usual lengths: (a) main pipes, 1,750 metres 900 millimetres in diameter; 1,020 metres 800 millimetres in diameter; 8,400 metres 700 millimetres in diameter; 100 metres 650 millimetres in diameter; 9,150 metres 600 millimetres in diameter; 2,450 metres 500 millimetres in diameter; 1,300 metres 450 millimetres in diameter; 1,210 metres 400 millimetres in diameter; 4,450 metres 350 millimetres in diameter; 2,470 metres 300 millimetres in diameter; 1,200 metres 250 millimetres in diameter; 18,500 metres 200 millimetres in diameter; (b) distribution pipes, 3,600 metres 150 millimetres in diameter; 7,800 metres 125 millimetres in diameter; 12,100 metres 100 millimetres in diameter. (2) Fittings for main pipes, 315 tons; for distribution pipes, 110 tons. Further information may be obtained from the Bureau de l'Alimentation en eau et de la Canalisation de la Ville, rue Scaune No. 45, whence will be supplied, against payment of 4s., the specification and form of tender in French, Roumanian, or German. Tenders to be handed in on said form, under registered and stamped envelope, not later than 11 a.m. on 8/21st May. The envelope to state "Soumission pour la fourniture de tuyaux en fer contrat No. 1," and to enclose the receipt for the deposit made with the Municipality.

MAY 22.—**Manchester.**—BRIDGE WORKS.—Manchester Improvement and Buildings Committee invite tenders for the strengthening of Smedley-lane Bridge, over the river Irk, and Irwell-street Bridge, over the river Irwell. Drawings may be seen, and specification, bill of quantities, and form of tender obtained, on application at the City Surveyor's office, Town Hall, Manchester, on payment to the City Treasurer of 2l. 2s. All cheques or postal orders are to be made payable to the order of "The Corporation of Manchester." Tenders, enclosed in the official envelope, and addressed to the Chairman of the Improvement, &c., Committee, to be delivered at the City Surveyor's office not later than 10 a.m. on May 22.

MAY 22.—**Manchester.**—CABLES.—Manchester Electricity Committee invite tenders for the supply of E.H.T. three-core three-phase feeder cables and ½ sq. in. L.T. concentric cable and tail-end boxes. Specifications and forms of tender may be obtained on application to Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall, Manchester. Tenders, duly endorsed and addressed to the Chairman of the Electricity Committee, must be delivered not later than noon on May 22.

MAY 23.—**Hambledon.**—WATER MAIN.—Hambledon R.D.C. invite tenders for supplying, laying-in, and jointing a 2-in. cast-iron socketed water main to extend from the reservoir on St. Martha's Hill to Tyting Lodge, White-lane. A specification of the proposed works can be seen on application to Mr. Edward L. Lunn, surveyor, 36, High-street, Guildford. Sealed and endorsed tenders are to be sent in to Mr. Ferdinand Smallpeice, Clerk to the said Council, 138, High-street, Guildford, not later than 2 o'clock on May 23.

MAY 23.—**Littlehampton.**—WATER MAINS.—Littlehampton U.D.C. invite tenders for the providing and laying-down of about 279 yds. of 3-in. diameter cast-iron water pipes, together with sluice valves, fire hydrants, etc., on East Ham Estate, and in Granville-road. Specification of work can be seen, and form of tender and schedule obtained, on application to the Council's Surveyor, Mr. H. Howard, F.S.I., Town Offices. Tenders, under cover, and marked "Water Mains," to be delivered at office of Mr. Arthur Shelley, Clerk to the Council, Littlehampton, not later than May 23.

MAY 24.—**Coventry.**—ELECTRICITY WORKS.—Coventry Corporation invite tenders for the supply and erection of Lancashire boilers, economiser, steel and water pipes, mechanical stoker, two 600 k.w. and one 300 k.w. alternators, two-phase motors. Copies of specification may be obtained from Mr. Joseph A. Jeckell, City Electrical Engineer, Corporation Electricity Works, Sandy-lane, Coventry, on receipt of 5l. 5s. Tenders will only be considered for a section or sections, and not for part of a section. Tenders to be addressed to the Town Clerk, Hay-lane, Coventry, and must be received by him on or before 10 a.m., May 24, sealed and endorsed "Tender for Electricity Works."

MAY 25.—**Manchester.**—GIRDERS.—Manchester Corporation Gas Committee invite tenders for the supply, delivery, and erection of thirty-seven steel girders over the river Medlock at their Gaythorn Station. Specification and drawing can be obtained from Mr. C. Nickson, Superintendent, Gas Department, Town Hall, on payment of 1l. 1s. Any further particulars required may be had on application to Mr. J. G. Newbigging, M.Inst.C.E., at his office, Rochdale-road Gasworks. Sealed tenders, addressed to the Chairman of the Gas Committee, and endorsed "Steel Girders, Gaythorn," must be delivered at the Gas Offices, Town Hall, not later than 9 a.m. on May 25.

MAY 26.—**Bradford.**—GIRDERS.—Bradford Corporation invite tenders for the supply and delivery at Bradford of 500 tons of steel girder rails, 22 tons of fish-plates, and 32 tons of joint pieces. Drawings, conditions, specifications, and form of tender may be obtained at the office of Mr. J. H. Cox, M.Inst.C.E., City Surveyor, Town Hall, Bradford. Sealed tenders, endorsed "Tender—Steel Rails," to be sent to Mr. Frederick Stevens, Town Clerk, Town Hall, Bradford, on or before May 26.

MAY 26.—**Nottingham.**—VALVES, HYDRANTS, ETC.—The Water Committee of the Corporation invite tenders for the supply of the undermentioned goods for the ensuing year:—1, cast-iron double-faced sluice valves and hydrants; 2, cast-iron main pipes; 3, lead piping, lead ingots; 4, gun metal taps and ferrule fittings. Specifications and drawings, together with samples, weights, etc., may be seen, and other information obtained, at the office of the Water Engineer, Mr. F. W. Davies, St. Peter's Church-side, and forms of tender may be obtained at that office on payment of one guinea. Tenders, endorsed "Tender for Valves," "Tender for Pipes," "Tender for Lead," "Tender for Taps," to be delivered to Mr. Samuel G. Johnson, Town Clerk, Guildhall, Nottingham, on or before June 11.

MAY 28.—**Beckenham.**—STEEL FOOTBRIDGE.—Beckenham U.D.C. invite tenders for the supply and erection of a steel footbridge, 6 ft. wide and 81 ft. span, over the Norwood Spur Railway in Avenue-road, Beckenham. Preliminary plans and sections may be seen, and specifications and forms of tender obtained, on application to Mr. John A. Angell, surveyor, on the production of a receipt from the collector for a deposit of 1l. Tenders, duly sealed, and endorsed "Tenders for Footbridge," to reach Mr. F. Stevens, Clerk to the Council, not later than 4 p.m., May 28.

MAY 29.—**India.**—ROOFING.—The South Indian Railway Company, Limited, invite tenders for the supply of roofing complete for platforms of new station in Madras, with sheltering shed and footbridge. Specifications and forms of tender may be obtained at the Company's offices. Tenders, addressed to the Company, marked "Tender for Roofing," must be left with Mr. Henry W. Notman, Managing Director, 55, Gracechurch-street, London, E.C., not later than 12 o'clock noon, May 29. A charge, which will not be returned, will be made of 1l. for each copy of the specification. Copies of the drawings may be obtained at the office of Sir George B. Bruce, 3, Victoria-street, Westminster, on payment of 8s. per sheet.

MAY 29.—**London.**—HOT-WATER HEATING.—The Metropolitan Asylums Board invite tenders for a hot-water heating apparatus in the Lower Administration Block at the South-Western Fever Hospital, Landor-road, Stockwell, S.W., in accordance with drawing and specification prepared by Mr. W. T. Hatch, M.Inst.C.E., M.I.Mech.E., Engineer-in-Chief. Drawings, specification, conditions of contract, and form of tender may be inspected at the office of the Board, Embankment, London, E.C., and can be obtained upon payment of a deposit of 1l. Tenders, addressed as noted on the form, must be delivered at the office of the Board not later than 10 a.m. on May 29.

MAY 30.—**Handsworth.**—PUMPING MACHINERY.—The U.D.C. of Handsworth invite tenders for a bore-hole pump, electric motor, etc., for their Grove-lane Baths. Tenders will only be considered for the whole of the work covered by the specification, and not for any part thereof. Copies of the specification, drawings, and conditions of contract can be obtained from Mr. H. Richardson, the Surveyor to the Council, on payment of three guineas for the same. Tenders on the prescribed form, in sealed envelopes, endorsed on the outside "Pumping Machinery," must be delivered at office of Mr. H. Ward, Clerk, the Council House, Handsworth, near Birmingham, before noon on May 30.

MAY 30.—**London.**—PIPE LAYING.—The Metropolitan Water Board invite tenders for the laying of 21-in. and 30-in. water mains in Harrow-road, Hammersmith, Fulham, and Kensington, in the Western District. Forms of tender, with schedule and conditions of contract, can be obtained from Mr. A. B. Pilling, Clerk of the Board, offices of the Board, Savoy-court, Strand, W.C., by personal application, or on receipt of stamped, addressed envelopes; and tenders, enclosed in sealed envelopes, addressed to the Clerk of the Board, and endorsed "Tender for Pipe Laying, Western District," must be delivered at the offices of the Board not later than 10 a.m. on May 30. Further particulars obtained at the office of the Engineer, Western District, Commercial-road, Pimlico, S.W.

JUNE 1.—**Leith.**—COAL HOIST.—The Commissioners for the Harbour and Docks of Leith invite designs and tenders for a movable hydraulic coal hoist, capable of lifting and tipping a waggon load of 30 tons at a height of 1 ft. above the level of the

quay, complete with cradle, shoot, anti-breakage crane, and other appliances. A plan of the site, with information as to the requirements, the conditions of contract, and other particulars, may be seen on application to the Engineer, Mr. Peter Whyte, M.Inst.C.E., Dock Offices, Tower-place, Leith. The tenders are to be delivered to Mr. Victor A. Noel Paton, Clerk to the Commission, 31, Melville-street, Edinburgh, on or before June 1.

JUNE 2.—**Chingford.**—STREET WORKS.—Chingford U.D.C. invite tenders for making-up and paving certain portions of the Station-road within the district, and for certain other works in connexion therewith, in accordance with plans and specifications prepared by the Council's Surveyor, copies of which may be obtained on application, and upon payment of a deposit of 2l. 2s. Tenders, which are to be sealed and endorsed "Tender for Street Improvements," to be delivered to Mr. Leonard C. Bowen, Clerk to the Council, at the Council Offices, Chingford, on or before 12 o'clock noon on June 2.

JUNE 6.—**Barham.**—IRON STAIRCASES.—The Guardians of the Bosmere and Claydon Union invite tenders for the completion of a partly-executed contract for the supply and fixing of three iron staircases at the Union Workhouse, at Barham, to the outside faces of the wings. Specifications, etc., and the form of contract may be inspected at the offices of the Guardians, 6, Providence-street, Ipswich. Orders to view the premises will be forwarded on application to Mr. R. M. Cook, Clerk, Union Offices, 6, Providence-street, Ipswich. Tenders should reach the offices of the Guardians by June 6.

JUNE 11.—**Burnham.**—GAS PLANT, ETC.—U.D.C. of Burnham (Somerset) invites tenders for the supply, delivery, and erection of a suction gas plant, gas engine, and treble-ram pump in connexion with their waterworks. Specification and drawings may be obtained from the waterworks engineer, Mr. Wm. H. Chowins, Manor-gardens, Burnham, on payment of 2l. 2s. Tenders, on the prescribed form only, endorsed "Tender for Machinery," must be delivered to Mr. D. S. Watson, Clerk, Town Hall, Burnham, Somerset, on or before June 11.

JUNE 15.—**North Shields.**—MACHINERY.—Tynemouth Guardians invite tenders, with plans and specifications, for supplying, fitting, and fixing complete to their satisfaction an installation of machinery for the wash-house and laundry of the Workhouse at North Shields. Tenders must include alternative quotations for steam or electric motive power. For particulars, personal application should be made at the Workhouse by appointment with the master. Sealed tenders to be delivered at office of Mr. Septimus Scott, Clerk to the Guardians, Guardians' Hall, North Shields, not later than June 15.

NO DATE. — **Rochdale.** — PIPES. — Rochdale Guardians invite tenders for the supply of about 1,400 yds. of 4-in. cast-iron pipes for water mains, and for a number of valves, hydrants, etc. Full information to be obtained by letter addressed to Mr. R. A. Leach, Union Clerk, Union Offices, Rochdale.

MISCELLANEOUS.

MAY 21.—**Islington.**—ROAD ROLLER.—Metropolitan Borough of Islington invite tenders for the supply and delivery of a 10-ton steam road-roller and scarifier. Form of tender and particulars can be obtained upon application to the Borough Engineer, Mr. J. Patten Barber, at the Town Hall, Upper-street, Islington, N. Sealed tenders, endorsed "Tender for Steam Road-Roller and Scarifier," must be received by Mr. Wm. F. Dewey, Town Clerk, Town Hall, Upper-street, Islington, N., not later than May 21.

MAY 21.—**West Riding.**—FURNITURE.—West Riding C.C. Education Committee invite tenders for certain furniture required at Balby Provided (temporary) School, Stanley Wrenthorpe Provided School (class-room), Bolton-on-Dearne Golfthorpe Provided School (class-room). Full particulars may be obtained from the Education Department (Elementary Branch), County Hall, Wakefield. Tenders must reach the County Hall not later than 9 a.m., May 21.

MAY 22.—**Belfast.**—PLUMBER'S WORK.—Belfast Works Committee invite tenders for the supply of plumber's work and materials for the year ending March 31, 1907. Forms of tender and particulars may be obtained at the Superintendent of Works Office, Townhall-street. Sealed tenders, on official forms only, endorsed "Tenders for Plumber's Work," to be lodged in office of Mr Samuel Black, Town Clerk, before 10 a.m. on May 22.

MAY 23. — **Barrow.** — FURNITURE. — Barrow-in-Furness Guardians invite tenders for the supply of twelve tables, ten forms, seventy-two chairs, also blinds for 100 windows for the Receiving and Cottage Homes, Roose-road, Barrow. Specification and samples may be seen at the workhouse on application to the master. Tenders to be enclosed in a sealed envelope, marked "Tenders for Furniture," and delivered at the Parish Offices, Harrison-street, before May 23, at 10 a.m.

MAY 23.—**Manchester.**—TRANSFORMERS, ETC.—Manchester Electricity Committee invite tenders for the supply, delivery, and erection of the following: Specification No. 6, seven 150 K.W. single-phase transformers; specification No. 7, high and low tension switchboards, for sub-stations. Specifications and forms of tender may be obtained on application to Mr. F. E. Hughes, Secretary, Electricity Department, Town Hall, Manchester. Tenders, duly endorsed and addressed to the Chairman of the Electricity Committee, must be delivered at the Town Hall not later than noon on May 23.

MAY 23.—**Oswestry.**—LIGHT RAILWAY.—The New Sweeney Brick, etc., Company, Ltd., invite tenders for the construction of about 1,100 yds. light railway, 4 ft. 8½ in. gauge. Particulars may be seen at the offices of the Company, at Oswestry. Tenders to be in by May 23. Mr. F. Williamson, Secretary.

MAY 23.—**Stanwix.**—SCAVENGING.—Carlisle R.D.C. invite tenders for the removal of the contents of the ashpits, etc., in Stanwix Township for the period from June 7, 1906, to February 7, 1907, the contractor to find a place for disposal of refuse, etc. Further particulars can be had from the Clerk, with whom tenders, endorsed "Ashes Tender," are to be left at 7, Victoria-place, Carlisle, before noon on May 23.

MAY 24. — **Sunderland.** — FIREGUARDS. — The Corporation of Sunderland invite tenders for the provision and fixing of 198 wrought-iron fireguards in the various schools in the borough. Copies of drawing, specification, and schedule of quantities may be obtained at the Borough Surveyor's Office, Town Hall. Sealed tenders, addressed "To the Chairman of the Education Works Sub-Committee," and endorsed "Tender for Fireguards," must be delivered at the Town Clerk's Office, Town Hall, before 12 o'clock noon on May 24.

MAY 25.—**Waterford.**—FURNISHING.—Waterford Technical Instruction Committee invite tenders for the furnishing of the chemical laboratory at the Waterford Central Technical School. All particulars can be had on application to Mr. J. J. Fleming, C.E., 44, Lady-lane, Waterford. Tenders, addressed to Mr. James J. Feely, Secretary, Town Hall, Waterford, endorsed "Tender for Furniture," will be received up to 1 o'clock on May 25.

MAY 28.—**Chertsey.**—HEATING.—Schemes and tenders (inclusive of all engineers and builders' work) for warming the Congregational Church building only, Chertsey, for the committee. Sealed tenders to be sent by 12 o'clock on May 28 to Mr. Bartholomew, Holly Bank.

MAY 28.—**Dublin.**—FIRE SIGNALLING APPARATUS.—Dublin Waterworks Committee invite tenders for fire signalling apparatus, annunciator, switchboard, internal wiring, and fire alarm bells, to be provided and fitted up in connexion with the new Central Fire Brigade Station, Great Brunswick-street. Plans, specifications, condition of contract, and form of tender may be inspected at the office of the City Architect, Municipal Buildings, Cork Hill, between the hours of 10 a.m. and 5 p.m. daily (Saturday excepted), and copies of specification and form of tender may be obtained in the office of the City Treasurer, Municipal Building, Cork Hill, on payment of 1l. Tenders, under seal, addressed to the "Chairman, Waterworks Committee," and endorsed "Tender for Fire Signalling Apparatus, Switchboard, Internal Wiring, etc.," to be lodged at the Waterworks Office, City Hall, Cork Hill, Dublin, not later than 4 o'clock on May 28.

MAY 28.—**Dublin.**—SWITCHBOARDS, ETC.—Dublin Lighting Committee invite tenders for the supply of sub-station switchboards and accessories, transformer pillars. Specifications, with general conditions, and form of tender, can be obtained from the City Electrical Engineer, Fleet-street, Dublin, on payment of one guinea for each specification. Tenders, addressed "Chairman of the Lighting Committee, 3, Cork Hill, Dublin," and marked "Tender for Sub-Station Switchboards, Transformer Pillars, etc.," to be delivered not later than May 28.

MAY 29.—**Southampton.**—COPPER PLATES.—The Director-General, Ordnance Survey, invites tender for the supply of copper plates for photo-etching. Applications for forms of tender and specification should be made to the Officer-in-Charge of Stores, Ordnance Survey Office, Southampton. All tenders must be submitted before noon on May 29.

MAY 31.—**London.**—FENCE.—St. Pancras Guardians invite tenders for supplying and fixing a barbed wire fence on the boundary walls of the Casual Wards, Holmes-road, as indicated on the plans to be seen upon application to Mr. W. Saxby, Superintendent of the Wards. Tenders should be delivered to Mr. Alfred A. Millward, Clerk to the Guardians, Town Hall, Pancras-road, N.W., not later than noon on May 31.

* JUNE 1.—**Southampton.**—DEALS, ETC.—The Director-General, Ordnance Survey, invites tenders for supply of deals and matched boarding. Applications for form of tender and specification should be made to the officer in charge of stores, Ordnance Survey Office, Southampton. Tenders to be submitted before noon, June 1.

JUNE 2.—**South Hetton.**—TIMBER.—The South Hetton Coal Company, Ltd., invite tenders for the supply of all kinds of colliery timber from July 1, 1906, to June 30, 1907. Forms of tender, with full conditions, may be obtained on application to Mr J. R. Lambert, South Hetton, near Sunderland. Tenders addressed to the South Hetton Coal Company, Ltd., South Hetton, near Sunderland, will be received up to June 2.

JUNE 11.—**Lympne.**—QUARRYING.—The Governors of the Harvey School Foundation, Folkestone, the owners of Combe Farm, Lympne, invite tenders for excavating the stone on the farm and depositing same on the surface of the land adjoining the proposed quarry, at per cube yard of stone so worked and deposited, the necessary plant for working the stone being furnished by the owners. Inspection of the trial hole on the site of the proposed quarry (which quarry may be five acres in extent) can be had on application to the tenant (Mr. P. Burgess) at the farm. Tenders, marked "Tenders for Quarrying Stone," to be sent not later than June 11 to the Clerk, Folkestone Borough Education Committee, Radnor-chambers, Folkestone.

JUNE 12 AND SEPTEMBER 4.—**Siam.**—CARRIAGES AND VANS.—For the supply of sixty-seven passenger carriages, seven guards' and luggage vans, 265 goods waggons (145 goods trucks and 120 ballast trucks), for the Royal Siamese State Railways. Drawings and conditions may be obtained, for a payment of 15s. per set, from Mr. W. A. Evans, Acting Financial Agent, Siamese Legation, 23, Ashburn-place, S.W. Sealed tenders, with the inscription, "Tender for Rolling Stock," must be forwarded to Mr. L. Weiler, Director-General, Railway Department, Bangkok, Siam, in whose office they will be publicly opened. For ballast waggons (items 15 and 16), tenders to be submitted by wire (A.B.C. code, fifth edition to be used) or letter, not later than June 12. Tenders for passenger carriages, guards' and luggage vans, goods trucks, to be submitted not later than September 4.

NO DATE.—**Chesterfield.**—SINKING A PIT.—For sinking a pit, 11 ft. diameter, finished 9-in. brick-work from the top hard to the deep soft seam, 210 yds., approximately. Work to be continued at week-ends. No water. Apply William Humble, Oxcroft Colliery, Bolsover, Chesterfield.

NO DATE.—**Dronfield.**—SLATING.—Tenders wanted for slating of works at Dronfield. Plans and particulars can be seen, Mr. Ridgill, architect, Green-lane, Dronfield.

PAINTING, etc

MAY 21. — **Plymouth.** — PAINTING. — Plymouth Corporation invite tenders for painting a ward pavilion at the borough hospital. Specifications for the work can be seen at the office of Dr. F. M. Williams, Medical Officer of Health, Health Department, 19, Whimple-street, Plymouth. Sealed tenders, endorsed "Tender for Painting," to be sent to Dr. Williams on or before May 21.

MAY 22.—**Selby and Market Weighton.**—PAINTING.—North-Eastern Railway Directors invite tenders for painting the company's property upon the Selby and Market Weighton Branch. Specification may be seen and further information obtained on application to Mr. E. Smith, the company's district engineer, Hull. Sealed tenders, marked "Tender for Painting Selby and Market Weighton Branch," to be sent to the Secretary at York not later than noon on May 22.

MAY 23.—**Nottingham.**—WHITEWASHING, ETC.—City of Nottingham Education Committee invite tenders for cleaning, painting, and whitewashing the out-offices at the various Council and Trust schools in the following districts, viz.:—Contract No. 1, Bulwell and Basford district; contract No. 2, Hyson Green, Basford, and Radford district; contract No. 3, Carrington, Mapperley, and Sherwood district; contract No. 4, Lenton, Radford, and Central district; contract No. 5, Sneinton and Meadows district. Specifications and forms of tender may be obtained from Mr. Frank B. Lewis, City Architect, Guildhall, on payment of a deposit of 1l. 1s. Sealed tenders to be delivered to the City Architect at or before 10 a.m. on May 23.

MAY 24.—**Chesterfield.**—PAINTING AND CLEANING.—Chesterfield Education Committee invite tenders for painting and cleaning the Christ Church National School, Stonegravels. Specification and form on application to Mr. C. J. Kerslake, Secretary, Education Offices, by whom tenders should be received not later than May 24.

MAY 24.—**Chesterfield.**—PAINTING AND CLEANING.—Chesterfield Education Committee invite tenders for painting and cleaning the cookery and laundry departments of the Central School. Specification and form on application to Mr. C. J. Kerslake, Secretary, Education Offices, by whom tenders should be received not later than May 24.

MAY 25. — **Cardiff.** — PAINTING, ETC. — Painting, decorating, papering, etc., to the Avondale and Lord Wimborne Hotels, Cardiff, for Messrs. Crosswell's Brewery Company, Ltd. Particulars and specification can be obtained at offices of Messrs. A. O. Evans, Williams, and Evans, architects, Pontypridd. Sealed and endorsed tenders to reach them on or before May 25.

MAY 26.—**Birmingham.**—CLEANING AND PAINTING.—The Birmingham Guardians invite tenders for cleaning and painting the main corridor of the workhouse, Western-road. Specifications and all information can be obtained on application to the Master, Mr. F. C. Mitchell, Workhouse, Western-road, Birmingham. Sealed tenders, endorsed "Tender for Painting Corridor," to be delivered to Mr. Charles Fletcher, Clerk to the Guardians, not later than May 26.

MAY 26. — **West Bromwich.** — CLEANING AND PAINTING.—West Bromwich Corporation invite tenders for the cleaning and painting of the interior of the Town Hall and Offices, in accordance with specification and conditions of contract, to be seen on application to Mr. Albert D. Greatorex, M.Inst.C.E., Borough Engineer and Surveyor, Borough Surveyor's Offices, Town Hall, West Bromwich. Sealed tenders, properly endorsed "Tender for Painting Town Hall," on the form provided, to be forwarded not later than noon on May 26.

MAY 28.—**Govan.**—PAINTING.—The Govan Combination Parish Council invite tenders for the painter work required for new laundry block at Merryflatts, Govan. Plans can be seen, and copies of schedules had, on application to the architects, Messrs. Thomson & Sandilands, 4, Jane-street, Blythswood-square, on payment of 1l. 1s. Schedules to be filled up and returned, sealed, and marked "Offer for Painter Work, New Laundry Block," to Mr. John Thomson, Governor, Merryflatts, Govan, not later than 12 noon on May 28.

* MAY 28.—**Hendon.**—PAINTING, ETC.—Painting and other works to the asylums in Cleveland-street, W., and Colindale-avenue, Hendon, N.W., for the Managers of the Central London Sick Asylum District. Specifications may be seen by appointment and bills of quantities obtained from Mr. William Lockwood, 12, Sherwood-street, Piccadilly-circus, W., upon deposit of 2l. 2s. Tenders, addressed to the Board of Management, to be delivered at the Clerk's office, Cleveland-street Asylum, not later than 2 p.m. Monday, May 28.

MAY 30.—**Whiston.**—CLEANING, PAINTING, ETC.—Prescot Guardians invite tenders for cleaning, painting, and decorating the chapel at Whiston Workhouse. Specification and particulars may be obtained at the office of Mr. Jas. Gandy, architect, St. Helens, on a deposit of 10s. Sealed tenders to be sent to Mr. A. F. Mann, Union Clerk, Union Offices, Whiston, not later than May 30.

* JUNE 5.—**Lambeth.**—PAINTING.—The Guardians of Lambeth invite tenders for painting at their infirmary. Forms of tender may be obtained, and draft of contract inspected, at Guardians' Offices, Brook-street, Kennington-road, S.E., between 10 a.m. and 5 p.m. Tenders, on the printed form, endorsed "Tender for Painting at Infirmary," by post to the Clerk to the Guardians, Brook-street, Kennington-road, S.E., before June 5.

NO DATE, — **Adderley.** — RENOVATIONS.— For the renovation of Adderley Church. Apply, in the first

instance by letter, to the Rev. C. J. Winser, Adderley Rectory, Market Drayton.

NO DATE.—**Kendal.**—PAINTING, ETC.—For painting and durescoing the whole of the internal walls, cleaning the roofs, marbio tablets on walls and other work for the vicar and churchwardens at Kendal Parish Church. Bills of quantities and other information may be obtained from Mr. John Hutton, M.R.S.I., architect, Kendal.

NO DATE.—**Tredegar.**—RENOVATING.—Renovating, painting, and papering the Bush Inn, Tredegar, for the Hereford and Tredegar Brewery Company, Ltd., Hereford. Plans and specification may be seen, and further particulars obtained, at offices of Mr. B. J. Francis, architect and surveyor, Abergavenny, or at the Bush Inn

ROADS, SANITARY AND WATER WORKS.

MAY 21.—**Halifax.**—ROAD WORKS.—Highways Committee of the Halifax Corporation invite tenders for the execution of private improvement works in Gilmour-street, and street leading from Old-lane to Woodside-road. Plans and specifications may be seen, and forms of tender obtained, on application to Mr. James Lord, M.I.C.E., Borough Engineer, Town Hall, Halifax, upon payment of the sum of 1l. Tenders, properly endorsed, must be sent to Mr. Keighley Walton, Town Clerk, on or before May 21.

MAY 23.—**Barrow.**—PAVING.—Barrow-in-Furness Guardians invite tenders for the flagging or tar-paving of the yards of the Receiving and Cottage Homes, in Roose-road, Barrow-in-Furness. Plans and specifications may be inspected at the office of Mr. H. T. Fowler, A.R.I.B.A., architect, Cornwallis-street. Tenders to be enclosed in a sealed envelope, marked "Tenders for Paving," and delivered at the Parish Offices, Harrison-street, before May 23, at 10 a.m.

MAY 23.—**Bristol.**—PLAYGROUNDS.—Bristol Education Committee invite tenders for re-laying and re-facing certain of the tar-paved playgrounds of the Council schools. Copies of the specification may be obtained from Mr. Peter Addie, at the Council House. Tenders, duly endorsed, must be delivered at the office of the Education Committee, Guildhall, by noon, May 23.

* MAY 23.—**Fulham.**—ROADMAKING.—The Fulham Borough Council invite tenders for making-up carriageway of Stevenage-road (section 2). Plans and specifications may be seen, and any information obtained, from Mr. Francis Wood, Borough Surveyor, Town Hall, Fulham, S.W. Tenders to Town Clerk, Town Hall, Fulham before 7 p.m., May 23.

MAY 26.—**Audenshaw.**—ROAD WORKS.—Audenshaw U.D.C. invite tenders for the sewering, paving, kerbing, flagging, etc., of Canning-street and Chatham-street. Plans and specifications may be seen and form of tender obtained at the office of Mr. William Clough, Engineer and Surveyor to the Council, upon payment of 1l. Tenders must reach Mr. F. Hamer, Clerk, Council Offices, 2, Guide-lane, Audenshaw, not later than May 26, endorsed "Chatham-street."

MAY 26.—**Chedzoy.**—LATRINES.—Somerset C.C. Education Committee invite tenders for improvements to latrines and ventilation at the Council School, Chedzoy. Plans, specification, and further information at the office of Messrs. Samson & Cottam, architects, Bridgwater. Sealed tenders must reach the County Education Office, Weston-super-Mare, before 12 noon on May 26.

MAY 28.—**Guildford.**—ROAD.—Guildford Town Council invite tenders for the construction of a new road, about 100 yds. in length and 40 ft. wide, throughout, and inclusive of certain works of sewerage and surface water drainage. Plans and specification may be seen, and forms of tender obtained, on application to Mr. C. G. Mason, A.M.I.C.E., the Borough Surveyor, at his offices, Tuns Gate. Tenders, endorsed "Tender for New Road," are to be sent to Mr. F. S. Miller, Town Clerk, Town Clerk's Office, Bridge-street, Guildford, on or before May 28.

MAY 28.—**Mistley.**—PAVING, ETC.—Tendring R.D.C. invite tenders for paving, metalling, channelling, and making up certain streets at Mistley. Specification, bill of quantities, and form of tender may be obtained upon application to the surveyor, Mr. J. Bell, at Great Bentley. Plan and conditions may be seen at the surveyor's house any week day, except Wednesdays, at 12 noon, provided twenty-four hours' notice is given. Sealed tenders, accompanied by priced bills of quantities, and endorsed "Tender for Private Street Works," must be sent to Mr. A. J. H. Ward, Clerk to the Council, 42, Church-street, Harwich, not later than May 28.

* MAY 28.—**Portsmouth.**—ASPHALT PAVING.—The Portsmouth Town Council invite tenders for laying and maintaining compressed asphalt pavement in certain streets. A lithographed copy of specification, form of tender, and schedule of prices may be obtained on application at Town Hall, Portsmouth, on payment of 2l. 2s. The form of tender, with schedule of prices attached to the specification, must be filled in, and the whole sent under cover to the Town Clerk, Town Hall, Portsmouth, before 10 a.m., May 28.

MAY 28.—**Surbiton.**—ROAD WORKS.—The U.D.C of Surbiton invite tenders for private street works at Ravenscar-road and Cranes-drive. Plans and specification can be inspected at the offices of the Council, and a copy of the estimated quantities will be supplied at the request of those who have examined the plans. Sealed tenders, made out on the forms, and enclosed in the envelope supplied, must be delivered at offices of Mr. James Bell, Clerk, District Council Offices, Surbiton, before 10 a.m. on May 28

MAY 29.—**Gateshead.**—PAVING.—Gateshead Corporation invite tenders for paving, etc., the following streets, viz.:—(1) Dean-street; (2) Back Beacon-street; (3) Back Derwent-gardens; (4) Myrtle Grove; (5) Back High-street, (6) Fern Dene-road; (7) Back Balmoral-avenue. Plans and specification may be seen and quantities obtained at the office of Mr. N. P. Pattinson, Borough Engineer, Town Hall. Tenders are to be sent in, sealed and endorsed "Tenders for Street Paving," on or before 2 p.m. on May 29.

MAY 29.—**Gateshead.**—PAVING.—Tenders are invited by the Corporation for re-paving Bridge-street and Church-street from the Swing Bridge to High-street, and Chandless-street, from High-street to Eldon-street. Plans and specification can be seen and quantities obtained at the office of Mr. N. P. Pattinson, Borough Engineer, Town Hall. Separate tenders are to be sent in, sealed and endorsed "Tender for Paving Bridge-street and Church-street" and "Tender for Paving Chandless-street," on or before 2 p.m., May 29.

MAY 30.—**Prestwich.**—STREET IMPROVEMENTS.—The U.D.C. of Prestwich invite tenders for the carrying out of works of private street improvement in Egerton-street, Heaton Park, and adjacent streets, and in Knott-lane, Prestwich, and the adjoining side street, within the Urban District of Prestwich, subject to general conditions of contract, which can be inspected at the surveyor's office, Chester Bank, Prestwich. Copies of the bills of quantities and any further information that may be required can be obtained from the surveyor on payment of 2l. 2s. Tenders must be sent in sealed envelopes, endorsed "Tender for Private Street Works," and must be delivered to Mr. Lewis A. Orford, Law Clerk to the Council, Council Offices, Chester Bank, Prestwich, not later than 10 a.m. on May 30.

MAY 31.—**Habrough.**—REPAIR OF PLAYGROUNDS.—The repair of the playgrounds of Habrough Council School, Lincs. either (1) with tar macadam, (2) asphalt, or (3) with gravel. Tenders to be sent to the Rev. C. C. Marris, Habrough Vicarage, Lincs, not later than May 31.

JUNE 2.—**Heston and Isleworth.**—PAVING.—Heston and Isleworth U.D.C. invite tenders for providing and laying complete upon the main roads in this district about 3,200 lin. yds. of 12-in. by 8-in. Norwegian granite kerbing, and 12-in. by 6-in. Norwegian granite channelling, and about 3,200 sq. yds. of Victoria stone paving, and all other incidental works. Forms, etc., obtained from Mr. P. G. Parkman, A.M.Inst.C.E., engineer and surveyor, Council House, Hounslow, W., upon payment of a deposit of 2l. 2s. Sealed tenders, endorsed "Main-road Paving," must be sent to Mr. H. J. Baker, Clerk to the Council, Council House, Hounslow, W., not later than June 2.

JUNE 5.—**Bishop's Stortford.**—PAVING.—Bishop's Stortford U.D.C. invite tenders for carrying-out works of paving, and improving various footpaths in their district. Plans and specifications can be seen at the office of the Council's Surveyor, Mr. R. S. Scott, A.M.Inst.C.E., 7, North-street, Bishop's Stortford. Tenders, endorsed "Tender for Street Works," to be sent to Mr. Thos. Swatheridge, Clerk, Council Offices, 7, North-street, Bishop's Stortford, by 4 o'clock on June 5.

* JUNE 6.—**Ealing.**—ROAD-MAKING.—The Ealing Town Council invite tenders for making-up Belsize-avenue, Kingsley-avenue (second portion), Leighton-road (second portion), and Corfton-road (second portion). Drawings and specification may be seen, and form of tender, together with schedule of quantities and other particulars, obtained, from Mr. Charles Jones, Borough Engineer, Town Hall, Ealing, W., upon payment of 10s. 6d. Sealed tenders, in envelopes provided, endorsed "Tender for Making-up ——," to Town Clerk, Town Hall, Ealing, before 9.30 a.m., June 6.

* JUNE 6.—**Finchley.**—SEWERAGE.—The Finchley U.D.C. invite tenders for a 12-in. sewer of about 700 yds. in length, together with manholes and other incidental works for the drainage of the White Hall Estate. To be constructed in accordance with plans and drawings, which may be inspected at the offices of the Engineer and Surveyor to the Council, Council Offices, Church End, Finchley, N. Copies of specification, schedule, and form of tender may be obtained from the engineer upon payment of 2l. Tenders, endorsed "Works of Sewerage," and addressed to Mr. E. H. Lister, Clerk, Council Offices, Church End, Finchley, before June 6.

JUNE 6.—**Hornsey.**—ROAD WORKS.—Hornsey Town Council invite tenders for sewering, levelling, paving, channelling, etc., Preston's-court. Forms of tender, etc., and all information can be obtained from Mr. E. J. Lovegrove, Borough Engineer and Surveyor, Municipal Offices, No. 99, Southwood-lane, Highgate, on any morning between 10 and 12 o'clock. Tenders must be on the prescribed form, and be delivered or sent by post (sealed and endorsed), so as to be deposited in the tender-box in the Town Clerk's office, by 4 p.m. on June 6. Quantities, duly completed, must accompany the tenders.

JUNE 6.—**London.**—TAR PAVEMENT.—The Streets Committee of the Corporation of London invite tenders for the laying of about 1,070 yds. of tar pavement in the Finsbury-circus-gardens. Further particulars to be obtained upon application to the City Engineer, Guildhall, E.C. Tenders must be addressed, Town Clerk, Public Health Department, Guildhall, E.C., and delivered at the office of the Hallkeeper, Guildhall, on or before June 6.

JUNE 7.—**Cheadle Hulme.**—SEWERS.—Cheadle and Gatley U.D.C. invite tenders for the construction of about 400 lin. yds. of 9-in. and 317 lin. yds. 12-in. earthenware pipe sewers, with manholes, etc., at Grove-lane, Cheadle Hulme. Plans and drawings may be seen, and copies of the specifications and bill of quantities obtained, on application to Mr. E. Sykes, C.E., at offices of U.D.C., Cheadle, near Manchester, between 10 and 12 o'clock a.m. daily until May 31 (Saturdays excepted), on deposit of 1l. 1s. Tenders, duly sealed, addressed to Clerk of Council, and endorsed "Tender for Sewers," may be delivered on or before June 7.

JUNE 8.—**Devonport.**—ROADS, ETC.—Devonport Corporation invite tenders for the various works required for the completion of the Embankment-road and sewers at Camel's Head, Devonport. Drawings and specification may be seen, form of tender, bill of quantities, and all further particulars obtained, on application to Messrs. James Diggle & Son, civil engineers, 14, Victoria-street, Westminster; or at the Clerk of Works' Office, Sewage Disposal Works, Camel's Head, Devonport. Sealed tenders, endorsed "Camel's Head Embankment," to be sent in to Mr. R. J. Fittall, Town Clerk, Town Clerk's Office, Devonport, not later than 12 noon on June 8.

JUNE 8.—**Thornaby-on-Tees.**—PLEASURE GARDENS.—Thornaby-on-Tees Corporation invite tenders for the undermentioned works:—Contract No. 1, laying-out, levelling, road-making, turfing, railbase, etc.; contract No. 2, wrought-iron railings, gates, etc., proposed Harewood pleasure gardens. Plans, etc., may be seen, and forms of tender, and other particulars obtained at the Borough Engineer's Office, Town Hall, Thornaby-on-Tees, on depositing cheque or postal order value 2l. Tenders, on the prescribed form only, must be sent to the Town Clerk on or before June 8, in sealed envelopes provided for the purpose. Mr. Chas. T. Johnson, A.M.Inst.C.E., Borough Engineer.

JUNE 8.—**Thornaby-on-Tees.**—VICTORIA RECREATION GROUND.—The Corporation invite tenders for the undermentioned works:—Contract No. 1, laying-out, levelling, drainage, road-making, seeding and turfing, railbase, etc.; contract No. 2, wrought-iron railings, gates, wrought-iron hurdling, etc. Plans, etc., may be seen, and forms of tender, and other particulars obtained, at the Borough Engineer's Office, Town Hall, Thornaby-on-Tees, during the usual office hours on depositing cheque or postal order value 2l. Tenders, on the prescribed form only, must be sent to the Town Clerk on or before June 8, in sealed envelopes provided for the purpose. Mr. Chas. T. Johnson, A.M.Inst.C.E., Borough Engineer.

JUNE 11.—**Fenton.**—SEWAGE DISPOSAL WORKS.—The U.D.C. of Fenton invite tenders for the following works:—Outfall sewers, comprising about 1,800 yds. of 15-in. stoneware pipes, and about 2,800 yds. of 15-in. cast-iron pipes, including manholes where required, also the construction of liquefying tanks and bacteria beds, pump well, erection of engine-houses and manager's house, and other incidental works in connexion therewith. Plans and specification may be seen, and bills of quantities obtained, on or after May 21, on application at the office of Mr. S. A. Goodall, Surveyor to the Council, Town Hall, Fenton, Staffordshire, and payment of a deposit of 5l. Plans, specification, and a copy of the bill of quantities may also be inspected at the offices of Messrs. Wilcox & Raikes, consulting engineers, 63, Temple-row, Birmingham. Sealed tenders, endorsed "Fenton Sewage Disposal," to be delivered at office of Mr. T. Adderley, Clerk to the Council, Town Hall, Fenton, Staffs, not later than 12 o'clock noon on June 11.

NO DATE.—**Mile End.**—DRAINAGE.—The guardians of Mile End Old Town invite tenders for the execution of certain drainage works at their workhouse in Bancroft-road, E. Forms of tender and full particulars, relating to the work, can be had on application at the office of Mr. J. M. Knight, the architect, 35, Bancroft-road, Mile End, E.

STONE, MATERIALS, AND STORES.

MAY 21.—**Guildford.**—ROAD MATERIAL.—Guildford R.D.C. invite tenders for the supply of the following material for use on the highways in the district during the year ending March 31, 1907, viz.:—3,650 tons of granite and basalt, 2,550 loads of Bargate stone, 8,330 yds. of flints, 1,400 yds. of Hungry Hill flints, and 100 yds. of Farnham gravel. Forms of tender and other information may be obtained from the Surveyor of the Council, Mr. J. Anstee, at the Council's Offices, Commercial-road, Guildford. Sealed tenders, endorsed "Tender for Road Material," must be sent to Mr. W. S. V. Cullerne, Clerk to the Council, R.D.C. Offices, Commercial-road, Guildford, not later than May 21.

MAY 21.—**Leyland.**—MATERIALS.—Leyland U.D.C. invite tenders for the supply of the following materials during the year ending March 31, 1907, viz.:—Broken granite and slag, kerbs, channel stones and rubble (local), concrete flags, and best steam coal. Tender forms and all particulars may be obtained on making application at, or by sending stamped, addressed envelope to, the Surveyor's Office, Public Hall-buildings, Towngate, Leyland, on or before May 22.

MAY 22.—**Monmouthshire.**—ROAD MATERIAL.—Monmouthshire C.C. invite tenders for the supply of materials or for hauling broken and unbroken stone for the repair of the main roads within the County for the year ending March 31, 1907. Particulars and schedules on application at the C.C. Offices, Newport. Sealed tenders to be sent to Mr. William Tanner, County Surveyor, C.C. Offices, Newport, on or before May 22, endorsed "Tenders for Hauling and Supplying Materials for Main Roads."

MAY 22.—**Whitefield.**—MATERIALS.—Whitefield U.D.C. invite tenders for the supply of the following for the year ending March 31, 1907:—Flags, setts and kerbs, broken macadam, earthenware pipes, junctions, etc., disinfectants, brushes, and refilling stocks of sweeping machine, chippings, pitch and creosote oil. Forms of tender may be obtained from Mr. William Skinner, surveyor, Council Offices, Elms-street, Whitefield. Tenders, endorsed "Tender for ——," are to reach the office of Mr. J. Phethean Monks, Clerk to the Council, by 12 noon on May 22.

MAY 23.—**Isle of Wight.**—ROAD MATERIAL.—The Isle of Wight R.D.C. invite tenders for the supply of materials for the repair of roads and highways in districts numbered 13 and 14, known as Totland and Freshwater district respectively, for three years. Copies of conditions, etc., may be obtained on application at the offices of Mr. H. Eldridge Stratton, Clerk to the said Council, R.D.C. Offices, Pyle-street, Newport, I.W. Each tender must be on one of the forms supplied, and must be enclosed separately in a sealed envelopes, marked on the outside "Tender for No. —— District," and must be delivered at the offices of the Council before 5 o'clock on May 23. Each contractor will be required to find sureties or to enter into a bond with some guarantee society in the sum of 150l. for the due performance of his contract.

MAY 23.—**Manchester.**—DRAIN PIPES, TIMBER, ETC.—The Cleansing Committee of the Manchester Corporation invite tenders for twelve months' supply of agricultural drain pipes, also twelve balks American oak, forty-five standards spruce deals,

two standards red deals, and one standard pine deals. Specifications and particulars may be obtained upon application to Mr. R. Williamson, Superintendent of the Cleansing Department, Town Hall, Manchester, and must be sent in before 10 o'clock on May 23.

MAY 24.—**Torpoint.**—STONE.—Torpoint U.D.C. invite tenders for the undermentioned quantities of stone (be the same, more or less), to be delivered on the beach at Torpoint when required:—500 tons Notter stones, machine broken; 80 tons gravel. For forms of tender and further particulars apply to Mr. F. A. Clark, Surveyor to the Council, 83, Old Town-street, Plymouth, to whom tenders should be sent by 12 o'clock noon on May 24.

MAY 28.—**Burgess Hill.**—FLINTS AND GRANITE.—The Burgess Hill U.D.C. require tenders for the supply of 200 yds. of surface dug flints, 650 tons of 1½-in. granite, and 40 tons of dust granite, for the repair of highways, to be delivered as required by September 29 next. Delivery may be either at Burgess Hill Railway Station, or on such of the roads within the district as may be directed by the surveyor. Persons tendering must state at which place they propose to deliver. Tenders, on forms to be obtained of the Clerk, sealed, and endorsed "Tender for Flints," or "Tender for Granite," as the case may be, and accompanied by samples, to be delivered to the Clerk to the Council, Burgess Hill, on or before May 28.

MAY 28.—**Farnborough.**—ROAD MATERIALS.—Farnborough U.D.C. invite tenders for the supply of the following materials and work:—Tarmac, Rhenish basalt, local gravel, Hungry Hill flints, steam rolling. Specifications and form of tender may be obtained upon application to Mr. J. E. Hargreaves, Surveyor, Town Hall, Farnborough, Hants. Tenders, sealed and endorsed, to be sent to Mr. Jno. A. Kingdon, Clerk to the Council, Town Hall, Farnborough, on or before May 28.

MAY 28.—**Witham.**—GRANITE AND SLAG.—Witham U.D.C. invite tenders for the supply of 500 tons of good granite, uniformly broken to 1½-in. gauge, also for 300 tons of blast-furnace slag, uniformly broken to 2-in. gauge, to be delivered in equal quantities weekly, carriage free, at the Witham Station of the Great Eastern Railway during the months of October, November, December. Tenders, endorsed "Tenders for Granite," or "Tenders for Slag," with samples, to be sent to Mr. Wm. Bindon Blood, Clerk of the Council, at the District Council Offices, Witham, Essex, on or before May 28.

MAY 29.—**Aldershot.**—TAR MACADAM.—Aldershot U.D.C. invite tenders for genuine iron slag tar macadam, about 700 tons, more or less, delivered f.o.r. at either of the town stations. Forms of tender and all particulars may be obtained upon application at the offices of the District Surveyor, Mr. F. C. Uren. Tenders, endorsed "Tar Macadam," to be sent to the Clerk, Mr. W. E. Foster, on or before May 29.

MAY 29.—**St. Neots.**—ROAD MATERIAL.—St. Neots U.D.C. invite tenders for supply of, and delivery to St. Neots Station, G.N.Ry., of about 1,000 tons broken granite, and 50 tons ironstone slag. Particulars and forms of tender can be obtained on application to Mr. John Edey, surveyor, South-street, St. Neots, Hunts. Sealed and endorsed tenders and samples to be delivered by 4 p.m., May 29.

* MAY 30.—**Kingston-on-Thames.**—GRANITE.—The Corporation of Kingston-on-Thames invite tenders for supply of 1,500 tons of Quenast, Guernsey, or other granite, suitable for road-making, to be broken. Forms of tender of Borough Surveyor, Municipal Offices, Kingston-on-Thames, where samples must be left. Sealed tenders to Town Clerk, Municipal Offices, Kingston-on-Thames, before May 30.

JUNE 1.—**Middlesbrough.**—STORES.—The Corporation of Middlesbrough invite tenders for the supply of stores for the ensuing twelve months, viz.:—Bolts and nuts, brushes, galvanised buckets, Lawson's black, candles, cords, copper and brass wire and tubes, roofing felt, files, glass, gripes, shovels, I. R. tubes etc., iron bars, sheet steel, lead, leather belting, nails, oils, paints, polishes, screws, tin, spun yarn, twine, shafts, W. I. steam tubes and fittings, varnish, wash leathers, waste, wipers, wicks, washers, etc. Specification and form of tender may be obtained on application to Mr. R. V. Thompson, jun., Stores Supt., 42, Commercial-street, Middlesbrough. Sealed tenders, endorsed "Tenders for Stores," to be forwarded to Mr. Alfred Sockett, Town Clerk, Municipal-buildings, Middlesbrough, not later than June 1.

JUNE 2.—**Clyde.**—STORES.—The trustees of the Clyde Navigation invite tenders for the supply of the undernoted stores for the year commencing July 1, 1906:—(1) Arden lime, etc; (2) asbestos and packing; (3) brass and other castings; (4) brooms, brushes, etc.; (5) coal; (6) cordage, etc.; (7) cotton waste; (8) short link crane chains; (9) drysalteries, etc.; (10) electrical stores; (11) files; (12) fireclay drain pipes; (13) glass; (14) hammer handles, etc.; (15) india rubber; (16) iron and steel; (17) iron castings; (18) ironmongery; (19) lead, etc.; (20) leather; (21) nails, etc.; (22) oars; (23) oils, etc.; (24) paints, etc.; (25) pitch, creosote, and lucigen oil; (26) printing, etc.; (27) rivets, etc.; (28) stationery; (29) steam tubing, etc. Specifications and forms of tender may be had on application to the Superintendent of Stores at his office here. Tenders must be lodged with Mr. T. R. Mackenzie, General Manager and Secretary, 16, Robertson-street, Glasgow, not later than 10 a.m. on June 2.

JUNE 2.—**Cramlington.**—MATERIALS.—Cramlington U.D.C. invite tenders for the undermentioned materials and work:—Contract No. 1, the supply of about 1,500 tons of machine broken whinstone to be delivered at Cramlington Station and Dam Dykes Siding; contract No. 2, the cartage of the above stone on to the highways, and the provision of a horse and man for water-cart; contract No. 3, the hire of a steam roller, and water-cart, or carts. Full particulars, specifications, conditions, and forms of tender may be had on application to Mr. W. J. Coulson, Surveyor, Council Office, Cramlington. Sealed tenders, endorsed "Tender," must reach the office of Mr. Robert Nicholson, Solicitor and Notary Public Clerk to the Council, 51, Bridge-street, Morpeth, not later than June 2.

NO DATE.—**Calverley.**—GRANITE, ETC.—Calverley U.D.C. invite tenders for granite, limestone, dross, etc. Particulars and forms of tender can be obtained from Mr. W. Walker, Surveyor, Council Offices, Calverley.

Public Appointments.

Nature of Appointment.	By whom Advertised.	Salary.	Applications to be in
*CLERK OF WORKS	Lindsey County Council	Not stated	May 25
*BOROUGH SURVEYOR AND ARCHITECT	Kingston-on-Thames Corp.	350*l.*	May 26
*BUILDING FOREMAN CARPENTERS (TWO) FOR LAGOS	Crown Agents for Colonies	180*l.*, etc.	May 28
*SECOND MASTER	Leicester Mun. School of Art	250*l.*	May 30
*ASSISTANT TEACHERS (TWO)	.....	150*l.* and 100*l.*	do.
*SUPERINTENDENT PLUMBER WANTED FOR RANGOON	.....	250 rupees per month	No date.

Auction Sales.

Nature and Place of Sale.	By whom Offered.	Date of Sale.
*BUILDING SITE, DERING-STREET, OXFORD-STREET, W.—At the Mart	Garrett, White, & Poland	May 22
*BUILDING LEASE, MARSHALL-STREET, SOHO, W.—At the Mart	Garrett, White, & Poland	do.
*BUILDING MATERIALS, TOOTING—At the Grange, Upper Tooting Coll., Trinity-rd., S.W.	Hooker & Webbe	do.
*FREEHOLD BUILDING SITE, HITHER GREEN—At the Mart	H. J. Bromley	do.
*STOCK-IN-TRADE OF WALL PAPER MANUFACTURER—48, Milton-street, E.C.	The Auction Company	do.
*DEALS, BATTENS, ETC.—Great Hall, Winchester House, Old Broad-street, E.C.	Churchill & Sims	May 23
*FREEHOLD BUILDING SITE, HANWELL—At the Mart	C. Rawley Cross & Co.	do.
*FREEHOLD BUILDING PLOTS, SOUTH ACTON—At the Mart	C. Rawley Cross & Co.	do.
*FREEHOLD BLDG. LAND, CATFORD—At the Black Horse Hotel, Rushey Green, Catford	Norfolk & Prior	May 24
*FREEHOLD BUILDING LAND, THORNTON HEATH—At the Mart	Daniel Watney & Sons	do.
*FREEHOLD ESTATE, SUNBURY-ON-THAMES—At the Mart	Buckland & Sons	May 28
*FREEHOLD BUILDING ESTATE, TEDDINGTON—At the Mart	Edwin Evans	May 30
*FREEHOLD SITE, KENNINGTON-PARK-ROAD—At the Mart	Farebrother, Ellis, Egerton, Breach, Galsworthy, & Co.	May 31
*BKMKG., ETC., PLANT, CURRAGH—Gt. Connell War Dept. Bkwks., Newbridge, Co. Kildare	Robert J. Goff & Co.	June 6
*FREEHOLD BUILDING LAND, BEECH HILL PARK—At the Mart	Debenham, Tewson, & Co.	June 12
*FREEHOLDS: WESTMINSTER, BATTERSEA, AND HERNE BAY—At the Mart	E. & H. Lumley	June 13
*BUILDING SITE, CHEAPSIDE—At the Mart	G. A. Wilkinson & Son	June 18
*FREEHOLD BUILDING ESTATE, PLYMOUTH—Law-chambers, Princess-square, Plymouth	Gilchrist & Bishop	June 14

PATENTS.—*Continued from page 565.*

23,418 of 1905.—A. HERMANN and H. HERZFELDER: *Process and Apparatus for the Manufacture of Slabs of Artificial Stone, or the like.*

This relates to a process for the production of artificial stone slabs from a mixture of hydraulic cementing materials and filamentous materials in which a woven surface is plunged as deep as possible into the fluid mass, and is there caused to oscillate for the purpose of the uniform distribution of the mass upon the woven surface, and when the woven surface is raised, the material deposited thereon is pressed into a layer and partly deprived of moisture by means of the motion of the woven surface through the mass, and the filaments retain their position in various directions but parallel to the surface of the slab, and the finished slabs possess a uniform consistence and strength in all directions.

358 of 1906.—C. H. R. SCHWARZ: *Pile Driving Machine.*

This relates to a pile-driving machine with variable gib, provided with a divided front sleeper or outer portions and hinge-jointed to the middle portion, and two front ties, so that by turning back the outer sleeper portions the machine can be used in corners.

16,249 of 1905.—P. N. HOOPER and E. A. DUCKHAM: *Method of Constructing and Laying Under Ground Mains for the Distribution of Electricity.*

This relates to a method of constructing and laying under ground mains for the distribution of electricity, and consists in the conductor or conductors of copper, aluminium, or other suitable metal, being supported by insulating rings or bushes in a duct or ducts made of some permanent material such as concrete, ferro-concrete, stoneware, and the like, the insulating material such as bitumen, bituminous compound or other suitable substance, vulcanised or otherwise for its protection, and the exclusion of moisture, being filled in a molten state after the conductor is in place. The whole may be then covered by a guard against mechanical injury by a removable covering or a cover made *in situ*.

3,960 of 1906.—W. WALLIS and J. WALLIS: *Ventilators.*

This relates to a ventilator having a central air shaft provided with slots or windows and a partial outer casing, and consists in the formation at the angles of the said outer casing of auxiliary air shafts of triangular section having openings opposite to each of the said windows.

7,732 of 1905.—P. V. VAUDREY: *Means for Electrically Indicating and Recording at a Distance Changes in Level of Liquid in Reservoirs, and for Giving Warning of any Pre-Arranged Maximum or Minimum Level.*

This relates to an electrical apparatus for automatically recording or indicating at any distance away the variations of level of water in a reservoir and consists of means whereby a wheel in the transmitter part of the apparatus is rotated in harmony and synchronously with the variation of said levels, said rotation causing the intermittent oscillation of a lever bringing into action a reversing commutator so adapted as to change the polarity of the line current, said rotation also setting and then discharging a propelling lever adapted to propel a rolling mass along a movable-inclined plane so as to set in action by the weight of said mass a balanced arm which closes the line circuit.

9,100 of 1905.—G. VERNON: *Gully, or like traps.*

This relates to a gully or like trap having a removable grid, and consists of a locking device

so formed that the grid may be secured therein by partially turning the latter round by means of a key or other removable instrument.

26,365 of 1905.—A. J. BOULT (J. J. HAROLD): *Piling for Subways, Foundations, Shafts, and Other Structures.*

This relates to a piling for subways, foundations, shafts, and other structures, and consists of beam members provided with flanges on opposite sides of one face thereof, planks adapted to engage the channels formed by said flanges, one of the flanges on one beam member being adapted to slide between the flange on another beam member and its plank, a plate at the outer edge of each of said planks extending over the back of the adjoining beam member, the plate being secured to the plank by bolts passing through its beam member.

TERMS OF SUBSCRIPTION.

"THE BUILDER" (Published Weekly) is supplied DIRECT from the Office to residents in any part of the United Kingdom at the rate of 18s. per annum (52 numbers) PREPAID. To all parts of Europe, America, Australia, New Zealand, India, China, Ceylon, etc., 26s. per annum.

Remittances (payable to J. MORGAN) should be addressed to The Publisher of "THE BUILDER," Catherine-street, W.C.

SUBSCRIBERS in LONDON and the SUBURBS, by prepaying at the Publishing Office 19s. per annum (52 numbers) or 4s. 9d. per quarter (13 numbers), can ensure receiving "The Builder" by *Friday Morning's Post.*

SOME RECENT SALES OF PROPERTY:

ESTATE EXCHANGE REPORT.

May 5.—By NORRIS & DUVAL (at Hertford).

Hertford.—Hertingfordbury-rd., etc., freehold building land, with residence and cottage thereon, 11 a. 3 r. 12 p. £3,300
Hertingfordbury-rd., enclosure of building land, 2 a. 2 r. 24 p., f. 1,200
7 to 29 (odd), Hertingfordbury-rd., f., w.r. 153*l.* 6s. 2,250
North-rd., a plot of land, 0 a. 2 r. 34 p., f... 300
North-rd., f.g.r. 2*l.*, reversion in 24 yrs.; also freehold garden ground, y.r. 2*l.* 610
Molewood-rd., a freehold meadow, 4 a. 3 r. 18 p. 625

May 7.—By WM. HOUGHTON.

City.—102, Bishopsgate-st. Within ("Baker's," Crosby Hall Coffee House), beneficial lease for 10 yrs., y.r. 335*l.*, with goodwill 550
Walthamstow.—28, The Drive, u.t. 57 yrs., g.r. 10*l.*, p. 620
46, Grosvenor Park-rd., u.t. 58 yrs., g.r. 10*l.*, p. 160

By ROGERS, CHAPMAN, & THOMAS.

Pimlico.—4 and 5, Hindon-st. (s.), u.t. 18 yrs., g.r. 10*l.* 10s., y.r. 112*l.* 1,010
114, Warwick-st., u.t. 20½ yrs., g.r. 9*l.* 8s., y.r. 70*l.* 480

By WEATHERALL & GREEN.

St. John's Wood.—24A, Cavendish-rd., with Studio, u.t. 14 yrs., g.r. 12*l.* 10s., y.r. 100*l.* 600

May 8.—By BOYTON, SONS, & TREVOR.

Fulham.—16 and 18, Dawes-rd. (s.), f., y.r. 122*l.* 1,880
Brompton.—Sedlescombe-rd., l.g.r. 28*l.*, u.t. 93½ yrs., g.r. 6*l.* 415
Sydenham.—Knighton Park-rd., f.g.r. 6*l.* 6s., reversion in 80 yrs. 150

By HARLAND & SON.

Highgate.—Broadlands-rd., "Denewood" and 1 a. 0 r. 30 p., u.t. 986 yrs., g.r. 85*l.*, e.r. 250*l.* 2,800

By DEBENHAM, TEWSON, & CO.

Wimbledon.—10, Park-rd., u.t. 71½ yrs., g.r. 6*l.* 15s., y.r. 40*l.* 365

May 9.—By G. F. HARRINGTON.

Peckham.—93, Sumner-rd. (s.), w.r. 31*l.* 4s.; also l.g.r. 4*l.*, u.t. 57½ yrs., g.r. 7*l.* 215
2 and 4, Shields-st., u.t. 57½ yrs., g.r. 6*l.*, w.r. 52*l.* 435
Brixton.—50 and 52, Ayton-rd., f., y.r. 78*l.* ... 1,080
Wandsworth.—Garratt-la., "The Grosvenor Arms," p.h., u.t. 60 yrs., g.r. 20*l.*, y.r. 150*l.* 1, 2, and 3, Grosvenor-ter. (s.), u.t. 60 yrs., g.r. 7*l.* 2s. 6d., y.r. 94*l.* 4s. 2,000
Clapham.—34, Gaskell-st., u.t. 56 yrs., g.r. 3*l.* 15s., w.r. 32*l.* 10s. 870
Bermondsey.—126, Alscot-rd. (s.), u.t. 13 yrs., g.r. 6*l.*, y.r. 45*l.* 260
Battersea.—11 and 21, Kerrison-st., u.t. 71½ yrs., g.r. 10*l.* 10s., w.r. 70*l.* 4s. 155
540

By C. C. & T. MOORE.

Poplar.—32, East India Dock-rd., f., y.r. 45*l.* .. 600
Bromley.—St. Leonard-st., a corner building site, f. 100
Barking.—St. Awdry's-rd., etc., 20 plots of freehold building land 630

By JOSEPH STOWER (at Hailsham).

Hellingly, Sussex.—Hellingly Mill and Stone House Farm, 48 a. 2 r. 25 p., f., p. 2,000

By MADDISON, Miles, & Co. (at Yarmouth).

Yarmouth.—24, Camden-rd., f., y.r. 15*l.* 10s., subject to g.r. 3*l.* 10s. 190
Gorleston, Suffolk.—25, Highfield-ter., f., y.r. 15*l.*, subject to g.r. 1*l.* 10s. 195

May 10.—By FAREBROTHER, ELLIS, & Co.

Hampstead.—Frognal, "The Old Mansion" and nearly one acre, f., p. 7,000
Frognal, "St. Nicholas" and nearly ½ of an acre, f., p. 7,000
Bosham, Sussex.—A freehold arable field, 31 a. 0 r. 21 p. 1,400
Broadbridge, a piece of land, 4 a. 1 r. 15 p., f. 245

By C. C. & T. MOORE.

Limehouse.—21, Limehouse-causeway (s.), c., w.r. 41*l.* 16s. 335

By NEWBON, SHEPHARD, & EDWARDS.

Islington.—28 and 29, Colebrooke-row, f., e.r. 130*l.* 1,370

Bowes Park.—3, 5, and 7, Natal-rd., u.t. 97½ yrs., g.r. 20*l.* 5s., e.r. 102*l.* £825
1, 3, 6, 9, 12, 14, 26, and 28, Lancaster-rd., u.t. 97½ yrs., g.r. 52*l.*, y.r. 258*l.* 2,045
Lewisham.—Lewisham-rd., l.g.r. 29*l.*, u.t. 45½ yrs., g.r. nil 460
Brockley.—Holdenby-rd., etc., l.g.r. 28*l.*, u.t. 71 yrs., g.r. 7*l.* 395

By STIMSON & SONS.

Holborn.—55, Theobalds-rd. (s.), u.t. 52 yrs., g.r. 25*l.*, y.r. 105*l.* 1,110
Bethnall Green.—208, Green-st. (s.), f., y.r. 34*l.* 450
Clapham.—50 and 54, Fentiman-rd., u.t. 19 yrs., g.r. 13*l.*, y.r. 80*l.* 320
16, Osborne-ter., u.t. 22 yrs., g.r. 7*l.* 10s., y.r. 42*l.* 180
Stockwell.—7 and 19, Stockwell Park-cres., u.t. 19½ yrs., g.r. 15*l.* 11s., y.r. 82*l.* 495
Brixton.—151, Loughborough-rd., u.t. 16½ yrs., g.r. 6*l.* 6s., y.r. 43*l.* 150
Peckham.—142, Peckham-rye, f., y.r. 45*l.* 740
Peckham-rye, f.g. rents 31*l.* 12s., reversion in 4 and 6 yrs. 1,390
East Dulwich-rd., f.g. rents 16*l.* 16s., reversion in 11 yrs. 600
East Dulwich-rd., f.g.r. 25*l.*, reversion in 13 yrs. 1,010
1 and 2, McDermott-rd. (s.), f., y.r. 59*l.* 4s... 860
4 to 8, Alpha-st., f., y.r. 151*l.* 2,300
Westcliff, Essex.—Tintern-av., four plots of building land, f. 120
Harrow, Middlesex.—Byron-hill, f.g.r. 12*l.*, reversion in 66 yrs. 345
West-hill, etc., f.g. rents 79*l.*, reversion in 48, 53, and 54 yrs. 1,995
West-hill, "Tennis Cottage," f., w.r. 7*l.* 16s. 100

May 11.—By FULLER & RUDDOCK.

Caledonian-road.—25, Lyon-st., u.t. 38½ yrs., g.r. 6*l.*, y.r. 28*l.* 190

By MARTEN & CARNABY.

Dulwich.—69, Alleyn-pk., u.t 53½ yrs., g.r. 8*l.*, p. 21, Carson-rd., u.t. 84½ yrs., g.r. 8*l.* 10s., y.r. 50*l.* 1,400 510

By MAY & ROWDEN.

St. John's Wood.—10, Marlborough-hill, u.t. 31½ yrs., g.r. 10*l.* 12s., y.r. 85*l.* 700

Contractions used in these lists.—F.g.r. for freehold ground-rent; l.g.r. for leasehold ground-rent; i.g.r. for improved ground-rent; g.r. for ground-rent; r. for rent; f. for freehold; c. for copyhold; l. for leasehold; p. for possession; e.r. for estimated rental; w.r. for weekly rental; q.r. for quarterly rental; y.r. for yearly rental; u.t. for unexpired term; p.a. for per annum; yrs. for years; la. lane; st. for street; rd. for road; sq. for square; pl. for place; ter. for terrace; cres. for crescent; av. for avenue; gdns. for gardens; yd. for yard; gr. for grove; b.h. for beerhouse; p.h. for public-house; o. for offices; s. for shops; ct. for court.

TO CORRESPONDENTS.

W. C. B. (there is no positive limit in law as to the angle of light; 45 deg. is a common requirement, but it has no legal force except as a custom).

W. H. R. (too late: next week).

NOTE.—The responsibility of signed articles, letters, and papers read at meetings rests, of course, with the authors.

We cannot undertake to return rejected communications; and the Editor cannot be responsible for drawings, photographs, manuscripts, or other documents, or for models or samples, sent to or left at this office, unless he has specially asked for them.

Letters or communications (beyond mere news items) which have been duplicated for other journals are NOT DESIRED.

All communications must be authenticated by the name and address of the sender whether for publication or not. No notice can be taken of anonymous communications.

We are compelled to decline pointing out books and giving addresses.

Any commission to a contributor to write an article, or to execute or lend a drawing for publication, is given subject to the approval of the article or drawing, when received, by the Editor, who retains the right to reject it if unsatisfactory. The receipt by the author of a proof of an article in type does not necessarily imply its acceptance. The Editor cannot undertake to read and consider articles offered for acceptance unless they are type-written.

All communications regarding literary and artistic matters should be addressed to THE EDITOR; those relating to advertisements and other exclusively business matters should be addressed to THE PUBLISHER, and not to the Editor.

MEETINGS.

FRIDAY, MAY 18.

Royal Institution.—Professor A. Schuster on "International Science." 9 p.m.

SATURDAY, MAY 19.

Royal Institution.—Professor Sir J. Dewar on "The Old and the New Chemistry"—I. 3 p.m.

Institute of Sanitary Engineers.—Visit to the Waltham Abbey Sewage Works.

Edinburgh Architectural Association.—Visit to Bonnybridge Foundry, Stirlingshire.

Incorporated Association of Municipal and County Engineers.—Metropolitan district meeting, to be held at Battersea. Discussion on the following paper. "Engineering Notes on the Public Works of a Metropolitan Borough—Battersea," by Mr. T. W. A. Hayward, Borough Engineer and Surveyor.

Junior Institution of Engineers.—Visit to Hornchurch, Essex, for inspection of a wharf being constructed in ferro-concrete. Train leaves Fenchurch-street (London, Tilbury, and Southend Line) at 2.40 p.m.

MONDAY, MAY 21.

Royal Institute of British Architects.—(1) Special General Meeting, to receive the report and recommendations of the Fellowship Procedure Committee. (2) Mr. Paul Waterhouse, M.A., on "The Report of the London Traffic Commission." 8 p.m.

Society of Arts (Cantor Lectures).—Mr. G. W. Eve on "Heraldry in Relation to the Applied Arts"—II. 8 p.m.

TUESDAY, MAY 22.

Carpenters' Hall, London Wall (Lectures on Carpentry and Joinery).—Mr. S. Barter on "Setting-out, Preparing and Fixing Joiners' Work." 7.30 p.m.

WEDNESDAY, MAY 23.

Society of Arts.—Mr. James N. Shoolbred, B.A., M.Inst.C.E., on "The General Supply of Electricity for Power and other Purposes." 8 p.m.

THURSDAY, MAY 24.

Institution of Electrical Engineers.—Annual General Meeting at the Society of Arts, John-street, Adelphi, W.C., to receive annual report of Council and statement of accounts for the year ending December 31, 1905, and to announce the election of the new Council. 8 p.m.

FRIDAY, MAY 25.

Royal Institution.—Mr. Leonard Hill on "Compressed Air and its Physiological Effects." 9 p.m.

SATURDAY, MAY 26.

Royal Institution.—Professor Sir James Dewar on "The Old and the New Chemistry"—II. 3 p.m.

PRICES CURRENT OF MATERIALS.

*** Our aim in this list is to give, as far as possible, the *average* prices of materials, not necessarily the lowest. Quality and quantity obviously affect prices—a fact which should be remembered by those who make use of this information.

BRICKS, &c.

	£ s. d.	
Hard Stocks	1 8 0	per 1000 alongside, in river.
Bough Stocks and Grizzles	1 5 0	" " "
Picked Stocks for Facings	2 15 0	" delivered.
Flettons	1 6 0	" at railway depot.
Red Wire Cuts	1 12 0	" " "
Best Fareham Red	3 12 0	" " "
Best Red Pressed Ruabon Facing	5 0 0	" " "
Best Blue Pressed Staffordshire	3 15 0	" " "
Do. Bullnose	4 0 0	" " "
Best Stourbridge Fire Bricks	3 14 0	" " "
GLAZED BRICKS.		
Best White and Ivory Glazed Stretchers	12 0 0	" " "
Headers	11 0 0	" " "
Quoins, Bullnose, and Flats	16 0 0	" "
Double Stretchers	19 0 0	" " "
Double Headers	16 0 0	" " "
One Side and two Ends	19 0 0	" " "
Two Sides and one End	20 0 0	" " "
Splays, Chamferred, Squints	20 0 0	" " "
Best Dipped Salt Glazed Stretchers, and Header	12 0 0	" " "
Quoins, Bullnose, and Flats	14 0 0	" " "
Double Stretchers	15 0 0	" " "
Double Headers	14 0 0	" " "
One Side and two Ends	15 0 0	" " "
Two Sides and one End	15 0 0	" " "
Splays, Chamferred, Squints	14 0 0	" " "
Second Quality White and Dipped Salt Glazed	2 0 0	" less than best.

	s. d.	
Thames and Pit Sand	6 9	per yard, delivered.
Thames Ballast	5 3	" "
Best Portland Cement	25 0	per ton, "
Best Ground Blue Lias Lime	19 0	" "

NOTE.—The cement or lime is exclusive of the ordinary charge for sacks.

Grey Stone Lime ..... 11s. 0d. per yard, delivered.
Stourbridge Fireclay in sacks 27s. 0d. per ton at rly. dpt.

STONE.

	s. d.	
BATH STONE—delivered on road waggons, Paddington Depôt	1 6½	per ft. cube.
Do. do. delivered on road waggons, Nine Elms Depôt	1 8½	" "
PORTLAND STONE (20 ft. average)—		
Brown Whitbed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2 1	" "
White Basebed, delivered on road waggons, Paddington Depôt, Nine Elms Depôt, or Pimlico Wharf	2 2½	" "

	s. d.	
Ancaster in blocks	1 10	per ft. cube, deld. rly. depôt.
Beer "	1 6	" "
Greenshill "	1 10	" "
Darley Dale in blocks	2 4	" "
Red Corsehill "	2 2	" "
Closeburn Red Freestone	2 0	" "
Red Mansfield "	2 4	" "
YORK STONE—*Robin Hood Quality.*		
Scappled random blocks	2 10	" "
6 in. sawn two sides landings to sizes (under 40 ft. super.)	2 3	per ft. super., "
6 in. rubbed two sides ditto, ditto	2 6	" "
3 in. sawn two sides slabs (random sizes)	0 11½	" "
2 in. to 2½ in. sawn one side slabs (random sizes)	0 7½	" "
1½ in. to 2 in. ditto, ditto	0 6	" "
HARD YORK—		
Scappled random blocks	3 0	per ft. cube, "
3 in. sawn two sides landings to sizes (under 40 ft. super.)	2 8	per ft. super., "
6 in. rubbed two sides ditto	3 0	" "

STONE (continued).

HARD YORK (continued)—				
3 in. sawn two sides slabs (random sizes)	1	2	per ft.sup.deld.rly.depôt.	
in. self-faced random flags	0	5	,,	,,
			s. d.	
Hopton Wood (Hard Bed) in blocks	2	0	per ft. cube, deld. rly. depôt.	
,, ,, ,, 6 in. sawn both sides landings	2	7	per ft.super.deld. rly. depôt.	
,, ,, ,, 3 in. sawn both sides random slabs	1	0	,,	,,
,, ,, ,, 2 in. do.	0	8½	,,	,,

SLATES.

In. In.	£	s.	d.	
20×10 best blue Bangor	13	2	6	per 1000 of 1200 at r. d.
20×12 ,, ,,	13	17	6	,, ,,
20×10 first quality ,,	13	0	0	,, ,,
20×12 ,, ,,	13	15	0	,, ,,
16×8 ,, ,,	7	5	0	,, ,,
20×10 best blue Portmadoc	12	12	6	,, ,,
16×8 ,, ,,	6	12	6	,, ,,
20×10 best Eureka unfading green	15	17	6	,, ,,
20×12 ,, ,,	18	7	6	,, ,,
18×10 ,, ,,	13	5	0	,, ,,
16×8 ,, ,,	10	5	0	,, ,,
20×10 permanent green	11	12	6	,, ,,
18×10 ,, ,,	9	12	6	,, ,,
16×8 ,, ,,	6	12	6	,, ,,

TILES.

	s.	d.	
Best plain red roofing tiles	42	0	per 1000 at rly. depôt.
Hip and Valley tiles	3	7	per doz. ,,
Best Broseley tiles	50	0	per 1000 ,,
Do. Ornamental tiles	52	6	,, ,,
Hip and Valley tiles	4	0	per doz. ,,
Best Ruabon red, brown, or brindled do. (Edwards)	57	6	per 1000 ,,
Do. Ornamental do.	60	0	,, ,,
Hip tiles	4	0	per doz. ,,
Valley tiles	3	0	,, ,,
Best Red or Mottled Staffordshire do. (Peakes)	51	9	per 1000 ,,
Do. Ornamental do.	54	6	,, ,,
Hip tiles	4	1	per doz. ,,
Valley tiles	3	8	,, ,,
Best "Rosemary" brand plain tiles	48	0	per 1000 ,,
Best Ornamental tiles	50	0	,, ,,
Hip tiles	4	0	per doz. ,,
Valley tiles	3	8	,, ,,
Best "Hartshill" brand plain tiles, sand-faced	50	0	per 1000 ,,
Do pressed	47	6	,, ,,
Do. Ornamental do.	50	0	,, ,,
Hip tiles	4	0	per doz. ,,
Valley tiles	3	6	,, ,,

WOOD.

BUILDING WOOD.	At per standard. £	s.	d.		£	s.	d.
Deals: best 3 in. by 11 in. and 4 in. by 9 in. and 11 in.	13	10	0	...	15	0	0
Deals: best 3 by 9	13	0	0	...	14	0	0
Battens: best 2½ in. by 7 in. and 8 in., and 3 in. by 7 in. and 8 in.	11	0	0	...	12	0	0
Battens: best 2½ by 6 and 3 by 6	0	10	0	less than 7 in. and 8 in.			
Deals: seconds	1	0	0	less thn best.			
Battens: seconds	0	10	0	,, ,,			
2 in. by 4 in. and 2 in. by 6 in.	9	0	0	...	10	0	0
2 in. by 4½ in. and 2 in. by 5 in.	8	10	0	...	9	10	0
Foreign Sawn Boards—							
1 in. and 1½ in. by 7 in.	0	10	0	more than battens.			
¾ in.	1	0	0	,,			
	At per load of 50 ft.						
Fir timber: best middling Danzig or Memel (average specification)	4	10	0	...	5	0	0
Seconds	4	0	0	...	4	10	0
Small timber (8 in. to 10 in.)	3	12	6	...	3	15	0
Small timber (6 in. to 8 in.)	3	0	0	...	3	10	0
Swedish balks	2	10	0	...	3	0	0
Pitch-pine timber (30 ft. average)	4	0	0	...	4	15	0

JOINERS' WOOD.	At per standard. £	s.	d.		£	s.	d.
White Sea: first yellow deals, 3 in. by 11 in.	24	0	0	...	25	0	0
3 in. by 9 in.	22	0	0	...	23	0	0
Battens, 2½ in. and 3 in. by 7 in.	16	10	0	...	18	0	0
Second yellow deals, 3 in. by 1 in.	18	10	0	...	20	0	0
,, ,, 3 in. by 9 in.	17	10	0	...	19	0	0
Battens, 2½ in. and 3 in. by 7 in.	13	10	0	...	14	10	0
Third yellow deals, 3 in. by 11 in. and 9 in.	13	10	0	...	15	0	0
Battens, 2½ in. and 3 in. by 7 in.	11	0	0	...	12	0	0
Petersburg first yellow deals, 3 in. by 11 in.	21	0	0	...	22	10	0
Do. 3 in. by 9 in.	18	0	0	...	19	10	0
Battens	13	10	0	...	15	0	0
Second yellow deals, 3 in. by 11 in.	16	0	0	...	17	0	0
Do. 3 in. by 9 in.	14	10	0	...	16	0	0
Battens	11	0	0	...	12	10	0
Third yellow deals, 3 in. by 11 in.	13	0	0	...	14	0	0
Do. 3 in. by 9 in.	12	10	0	...	14	0	0
Battens	10	0	0	...	11	0	0
White Sea and Petersburg—							
First white deals, 3 in. by 11 in.	14	10	0	...	15	10	0
,, ,, 3 in. by 9 in.	13	10	0	...	14	10	0
Battens	11	0	0	...	12	0	0
Second white deals, 3 in. by 11 in.	13	10	0	...	14	10	0
,, ,, 3 in. by 9 in.	12	10	0	...	13	10	0
,, ,, battens	10	0	0	...	11	0	0
Pitch-pine: deals	18	0	0	...	21	0	0
Under 2 in. thick extra	0	10	0	...	1	0	0
Yellow Pine—First, regular sizes	44	0	0	upwards.			
Oddments	32	0	0	,,			
Seconds, regular sizes	33	0	0	,,			
Yellow Pine oddments	28	0	0	,,			
Kauri Pine—Planks, per ft. cube	0	3	6	...	0	5	0
Danzig and Stettin Oak Logs—							
Large, per ft. cube	0	3	0	...	0	3	6
Small ,, ,,	0	2	6	...	0	2	9
Wainscot Oak Logs, per ft. cube	0	5	6	...	0	6	0
Dry Wainscot Oak, per ft. sup. as inch	0	0	6½	...	0	0	9½
¼ in. do. do	0	0	7	...		—	

WOOD (continued).

JOINERS' WOOD (continued)—	At per standard. £	s.	d.		£	s.	d.
Dry Mahogany—Honduras, Tabasco, per ft. super. as inch	0	0	9	...	0	1	0
Selected, Figury, per ft. super. as inch	0	1	6	...	0	2	6
Dry Walnut, American, per ft. super. as inch	0	0	10	...	0	1	0
Teak, per load	17	0	0	...	22	0	0
American Whitewood Planks, per ft. cube	0	4	0	...	0	5	0
Prepared Flooring, etc.—	Per square.						
1 in. by 7 in. yellow, planed and shot	0	13	6	...	0	17	6
1 in. by 7 in. yellow, planed and matched	0	14	0	...	0	18	0
1¼ in. by 7 in. yellow, planed and matched	0	16	0	...	1	0	0
1 in. by 7 in. white, planed and shot	0	12	0	...	0	14	6
1 in. by 7 in. white, planed and matched	0	12	6	...	0	15	0
1¼ in. by 7 in. white, planed and matched	0	15	0	...	0	16	6
¾ in. by 7 in. yellow, matched and beaded or V-jointed brds.	0	11	0	...	0	13	6
1 in. by 7 in. ,, ,,	0	14	0	...	0	18	0
¾ in. by 7 in. white ,, ,,	0	10	0	...	0	11	6
1 in. by 7 in. ,, ,,	0	12	9	...	0	15	0

6 in. at 6d. to 9d. per square less than 7 in.

JOISTS, GIRDERS, &c.

	In London, or delivered Railway Vans, per ton. £	s.	d.		£	s.	d.
Rolled Steel Joists, ordinary sections	7	0	0	...	7	10	0
Compound Girders, ordinary sections	9	0	0	...	10	0	0
Steel Compound Stanchions	12	0	0	...	13	0	0
Angles, Tees, and Channels, ordinary sections	9	0	0	...	10	0	0
Flitch Plates	9	0	0	...	10	0	0
Cast Iron Columns and Stanchions including ordinary patterns	7	10	0	...	8	10	0

METALS.

	Per ton, in London. £	s.	d.		£	s.	d.
IRON—							
Common Bars	8	0	0	...	8	10	0
Staffordshire Crown Bars, good merchant quality	8	10	0	...	9	0	0
Staffordshire "Marked Bars"	10	10	0	...	—		
Mild Steel Bars	8	15	0	...	9	0	0
Hoop Iron, basis price	9	5	0	...	9	10	0
,, ,, Galvanised	17	0	0	...	—		
("And upwards, according to size and gauge.)							
Sheet Iron Black—							
Ordinary sizes to 20 g.	9	10	0	...	—		
,, ,, 24 g.	10	10	0	...	—		
,, ,, 26 g.	12	0	0	...	—		
Sheet Iron, Galvanised, flat, ordinary quality—							
Ordinary sizes, 6 ft. by 2 ft. to 3 ft. to 20 g.	14	0	0	...	—		
Ordinary sizes to 22 g. and 24 g.	14	10	0	...	—		
,, ,, 26 g.	15	0	0	...	—		
Sheet Iron, Galvanised, flat, best quality—							
Ordinary sizes to 20 g.	17	0	0	...	—		
,, ,, 22 g. and 24 g.	17	10	0	...	—		
,, ,, 26 g.	19	0	0	...	—		
Galvanised Corrugated Sheets—							
Ordinary sizes 6 ft. to 8 ft. 20 g.	14	0	0	...	—		
,, ,, 22 g. and 24 g.	14	10	0	...	—		
,, ,, 26 g.	15	15	0	...	—		
Best Soft Steel Sheets, 6 ft. by 2 ft. to 3 ft. by 20 g. and thicker	11	10	0	...	—		
Best Soft Steel Sheets, 22 g. & 24 g.	12	10	0	...	—		
,, ,, ,, 26 g.	14	15	0	...	—		
Cut Nails, 3 in. to 6 in.	9	10	0	...	9	15	0
(Under 3 in., usual trade extras.)							

LEAD, &c.

	Per ton, in London. £	s.	d.		£	s.	d.
LEAD—Sheet, English, 3lb. and up.	19	10	0	...	—		
Pipe in coils	20	0	0	...	—		
Soil pipe	22	10	0	...	—		
Compo pipe	22	10	0	...	—		
ZINC—Sheet—							
Vieille Montagne ton	32	0	0	...	—		
Silesian	31	5	0	...	—		
COPPER—							
Strong Sheet per lb.	0	1	0	...	—		
Thin ,, ,,	0	1	1	...	—		
Copper nails ,,	0	0	11	...	—		
BRASS—							
Strong Sheet ,,	0	0	11	...	—		
Thin ,, ,,	0	1	0	...	—		
TIN—English Ingots ,,	0	2	0	...	—		
SOLDER—Plumbers' ,,	0	0	9½	...	—		
Tinmen's ,,	0	0	11	...	—		
Blowpipe ,,	0	1	0	...	—		

ENGLISH SHEET GLASS IN CRATES OF STOCK SIZES.

15 oz. thirds	2½d.	per ft. delivered.
,, fourths	1½d.	,, ,,
21 oz. thirds	3½d.	,, ,,
,, fourths	2½d.	,, ,,
26 oz. thirds	4½d.	,, ,,
,, fourths	3½d.	,, ,,
32 oz. thirds	5d.	,, ,,
,, fourths	4½d.	,, ,,
Fluted Sheet, 15 oz.	3½d.	,, ,,
,, 21 oz.	4½d.	,, ,,

ENGLISH ROLLED PLATE IN CRATES OF STOCK SIZES.

¼ Hartley's	2d.	per ft. delivered.
⅛ ,,	2½d.	,, ,,
⅜ ,,	2½d.	,, ,,
Figured and Oxford Rolled "Oceanic" Glass, white	4d.	,, ,,
Do. ,, tinted	5½d.	,, ,,

OILS, &c.

		£	s.	d.
Raw Linseed Oil in pipes	per gallon	0	2	0
,, ,, ,, in barrels	,,	0	2	1
,, ,, ,, in drums	,,	0	2	3
Boiled ,, ,, in pipes	,,	0	2	2
,, ,, ,, in barrels	,,	0	2	3
,, ,, ,, in drums	,,	0	2	5
Turpentine in barrels	,,	0	4	1
,, in drums	,,	0	4	3

OILS, &c. (continued).

		£	s.	d.
Genuine Ground English White Lead	per ton	22	10	0
Red Lead, Dry	,,	21	10	0
Best Linseed Oil Putty	per cwt.	0	7	0
Stockholm Tar	per barrel	1	12	0

VARNISHES, &c.

	Per gallon. £	s.	d.
Fine Pale Oak Varnish	0	8	0
Pale Copal Oak	0	10	6
Superfine Pale Elastic Oak	0	12	6
Fine Extra Hard Church Oak	0	10	0
Superfine Hard-drying Oak, for seats of Churches	0	14	0
Fine Elastic Carriage	0	12	6
Superfine Pale Elastic Carriage	0	16	0
Fine Pale Maple	0	16	0
Finest Pale Durable Copal	0	18	0
Extra Pale French Oil	1	1	0
Eggshell Flatting Varnish	0	18	0
White Copal Enamel	1	4	0
Extra Pale Paper	0	12	0
Best Japan Gold Size	0	10	6
Best Black Japan	0	16	0
Oak and Mahogany Stain	0	9	0
Brunswick Black	0	8	6
Berlin Black	0	16	0
Knotting	0	10	0
French and Brush Polish	0	10	0

PUBLISHER'S NOTICES.

Nat. Tel., 6112, Gerrard. Telegrams, "The Builder, London."

CHARGES FOR ADVERTISEMENTS.

COMPETITIONS, CONTRACTS, ALL NOTICES ISSUED BY CORPORATE BODIES, COUNTY AND OTHER COUNCILS, PROSPECTUSES OF PUBLIC COMPANIES, SALES BY TENDER, LEGAL ANNOUNCEMENTS, etc., etc.

Six lines or under ..... 6s. 0d.
Each additional line ..... 1s. 0d.

SITUATIONS VACANT, PARTNERSHIPS, APPRENTICESHIPS, TRADE AND GENERAL ADVERTISEMENTS.

Six lines (about fifty words) or under ..... 4s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

Terms for series of Trade advertisements, and for front page and other special positions, on application to the Publisher.

SITUATIONS WANTED (Single-handed—Labour only).

Four lines (about thirty words) or under ..... 2s. 6d.
Each additional line (about ten words) ..... 0s. 6d.

PREPAYMENT IS ABSOLUTELY NECESSARY.

. Stamps must not be sent, but all sums should be remitted by Postal Orders, payable to J. MORGAN, and addressed to the Publisher of "THE BUILDER," Catherine Street, W.C.

Advertisements for the current week's issue are received up to THREE o'clock p.m. on THURSDAY, but "Classification" is impossible in the case of any which may reach the Office after HALF-PAST ONE p.m. on that day. Those intended for the Outside Wrapper should be in by TWELVE NOON on WEDNESDAY.

ALTERATIONS IN STANDING ADVERTISEMENTS or ORDERS TO DISCONTINUE same must reach the Office before TEN o'clock on WEDNESDAY MORNING.

The Publisher cannot be responsible for DRAWINGS, TESTIMONIALS, etc., left at the Office in reply to advertisements, and strongly recommends that of the latter COPIES ONLY should be sent.

ADVERTISERS in "THE BUILDER" may have *Replies addressed to the Office*, Catherine Street, Covent Garden, W.C., *free of charge*. Letters will be forwarded if addressed envelopes are sent together with sufficient stamps to cover the postage. Unused stamps are returned to advertisers the week after publication.

N.B.—The Reply Boxes are not intended for trade lists, circulars, and the like; should these be received, they cannot (if noticed) be forwarded.

AN EDITION Printed on THIN PAPER, for FOREIGN and COLONIAL CIRCULATION, is issued every week.

READING CASES { NINEPENCE EACH. By post (carefully packed) 1s.

TENDERS.

Communications for insertion under this heading should be addressed to "The Editor," and must reach us *not later than* 10 *a.m. on Thursdays*. [N.B.—We cannot publish Tenders unless authenticated either by the architect or the building-owner; and we cannot publish announcements of Tenders accepted unless the amount of the Tender is stated, nor any list in which the lowest Tender is under 100*l.*, unless in some exceptional cases and for special reasons.]

* Denotes *accepted*. † Denotes *provisionally accepted*.

BADBY.—For water supply works, for Daventry Rural District Council. Mr. J. B. Williams, Engineer, Moot Hall, Daventry:—

W. E. James, Daventry £837 15 1

BASINGSTOKE.—For the construction of a circular concrete high-level service reservoir, for the Corporation. Mr. F. Reginald Phipps, Borough and Waterworks Engineer, Town Hall, Basingstoke:—

T. Turner	£2,192	8	3
W. Griffiths & Co., Ltd.	1,939	1	1
Goodall & Sons	1,781	0	0
Mussell-white, & Sapp	1,749	0	0
G. Napier & Sons, Ltd.	£1,614	14	6
W. North	1,591	7	10
F. Osman, Southampton*	1,591	0	0

BRENTWOOD (Essex).—For cleaning and painting works at High Wood School, for the Metropolitan Asylums Board. Mr. W. T. Hatch, Engineer-in-Chief:—

Callow, Wright, & Hewlett, Ltd.	£1,189	10	
Newell & Lusty	745	0	
F. W. Burtwell	700	0	
H. C. Horswell	662	0	
Vigor & Co.	600	0	
Sabey & Son, Ltd.	600	0	
Choat & Son	589	0	
R. Woollaston & Co.	532	18	
W. J. Simms & Sons	500	0	
B. T. Burnell & Sons	£478	15	
J. Arundel (Exors. of)	395	0	
W. Hussey	379	0	
A. Beritier & Co.	359	0	
Woollaston Bros., 22, Rockmead-road, South Hackney*	350	0	

BANBRIDGE (Ireland).—For erecting a dispensary and dispensary residence, Crossgar, for the Guardians. Mr. W. W. Larmor, architect:—

J. Graham	£1,240 0	J. H. Burns, Dromor, Co. Down*	£1,228 10

BRIDLINGTON.—For the erection of shop, stables, and premises, Marshall-avenue, for Mr. A. Knaggs. Mr. J. Earnshaw, architect, Bridlington:—

A. A. Booth, Bridlington* £269

DYSART.—For supplying and laying in streets about 350 yds. of fireclay drain, from 9-in. to 15-in. diameter, and about 120 yds. of 21-in. cast-iron pipe to beach; also supplying and laying about 1,500 super. yds. of causeway on Shore-road, 300 lineal ft. of kerb, and 1,300 lineal ft. of channel, for the Dysart Borough Council. Mr. D. Forbes Smith, surveyor, 210, High-street, Kirkcaldy. Quantities by surveyor:—

Drains.

A. Fraser, Sinclairtown* £896 16 5

Causeway.

A. Fraser, Sinclairtown* 973 4 10

EASTBOURNE.—For additions to motor omnibus house at Roselands, for the Motor Omnibus Committee. Mr. A. E. Prescott, Borough Surveyor, Town Hall, Eastbourne:—

A. J. White	£1,130	M. Hookham	£1,059
E. Cornwell & Son	1,112	J. Martin*	994
C. P. Dennis & Co.	1,074		

[All of Eastbourne.]

FLORE.—For small outfall sewerage works, for Daventry Rural District Council. Mr. J. B. Williams, Engineer, Moot Hall, Daventry:—

Holme & Sons, Leicester‡ £387 2 4

‡On schedule.

GUILDFORD.—For post-office enlargement:—

		Credit.
Cropley & Sons	£5,200	£70
A. Johnson	5,075	68
Hylett & Hammond	4,997	75
T. Robinson	4,950	100
D. Fry	4,865	15
A. & F. Gammon	4,900	79
A. J. Colborne	4,712	25
Drowley & Co.	4,747	82
Potter Bros.	4,712	162
F. Deacon & Son	4,467	90
R. Dean & Co.	4,290	54
Haslemere Builders, Ltd.	4,375	144
Crosby & Co.	4,298	150
R. Wood & Son	4,292	160
E. Wallis & Son, Ltd.	4,238	160
F. & G. Foster	4,128	75
H. Lindfield & Son	4,188	188
Martin, Wells, & Co., Ltd.	4,220	220
R. Cook & Sons	4,014	115
Rowland Bros.	4,048	149
R. Smith	3,850	25
McC. E. Fitt*	3,965	187

GUILDFORD.—For alterations and repairs to premises, Walnut Tree Close-road, for Messrs. J. H. & R. T. Billing. Mr. E. Goodrham Nye, architect and surveyor, Jenner-road, Guildford. Quantities by the architect:—

Mitchell Bros.	£360 0 0	Wallis & Bennett	£278 19 9
A. Johnson	339 0 0	F. Deacon & Son	272 0 0
W. H. Hyde	322 0 0	Martin, Wells, & Co., Ltd.	263 0 0
R. Smith	312 0 0	Crosby & Co., Farnham‡	232 0 0
W. Smith & Sons	298 0 0		
R. Wood & Son	285 0 0		
Tribe & Robinson	283 0 0		

‡ Recommended for acceptance.

HAINAULT.—For adaptation of buildings at Foxburrows Farm, Hainault Forest, for the London County Council:—

Partridge Bros.	£524 0	Dowsing & Dowling	£435 0
J. S. Hammond & Son	496 7	W. E. Westgate, Mawney-road, Romford*	310 0
F. Harman	455 0		

HANLEY.—For extension of Glost Stock Warehouse at Trent Sanitary Works, for Messrs. Johnson Bros. (Hanley), Ltd. Messrs. E. L. Maddock & Sons, architects, Hanley. Quantities by the architects:—

T. Godwin	£1,139	P. H. Bennion	£1,094
T. R. Yoxall	1,128	J. Bagnall	1,040
G. Ellis	1,110	Cornes & Sons*	1,000
Tompkinson & Betterilley	1,103		

HARROW-ON-THE-HILL.—For making-up private streets, for the Urban District Council. Mr. J. Percy Bennetts, Engineer and Surveyor, Harrow:—

Shelborne & Co.	£6,478 1 7	A. B. Champnies	£5,324 0 0
Wimpey & Co.	5,965 3 3	G. Mann	5,266 2 0
W. H. Worthington	5,641 16 0	Free & Sons	5,261 2 9
H. Brown	5,591 7 11	S. Adams	5,230 4 2
H. Wooster	5,591 4 8	Bower Bros., West Bridgford, Nottingham*	5,175 1 6
E. & E. Iles	5,373 18 1		
Mowlem & Co.	5,346 0 0		

HENGOED.—For erecting a new English Baptist chapel, for Trustees of the Tabernacle English Baptist Church, Hengoed, Glamorgan. Mr. G. Kenshole, architect and surveyor, Station-road, Bargoed:—

R. Jones, Maesycwmmer and Aber* £687

HEREFORD.—For erecting a villa residence on the Highfield Building Estate, Tupsley, for Mr. E. C. Witherstone. Messrs. Groome & Bettington, architects and surveyors, Hereford:—

R. Taylor	£480 0	W. Powell	£389 0
J. T. Jones	434 0	C. Cooke*	366 10
E. W. Wilks	415 0		

[All of Hereford. Architects' estimate, £368.]

LINCOLN.—For erecting Wesleyan School Chapel, West Parade. Messrs. Green, Knowles, & Russell, architects, Adelphi Bank-chambers, South John-street, Liverpool:—

W. Wright & Son	£2,205 0	Mawer Bros.	£1,600 10
Halkes Bros.	1,778 0	R. Marriott, Rushden*	1,656 0
Lansdown & Son	1,752 16		

LONDON.—For providing and laying creosoted deal blocks, Holland Park-avenue, Thurloe-place, and Church-street, for the Royal Borough of Kensington. Mr. A. R. Finch, Borough Engineer and Surveyor, Town Hall, Kensington High-street:—

—	Holland Park-avenue.	Thurloe-place.	Church-street.	
	Per super. yard. s. d.	Per super. yard. s. d.	Per super. yard. s. d.	Per super. yard.‡ s. d.
J. Mowlem & Co., Ltd.	7 8	7 6	7 6	9 9
Improved Wood Pavement Co., Ltd.	7 5	7 6	7 7	9 6
Acme Flooring and Paving Co. (1904) Ltd.	7 5	7 5	7 5	10 3
W. Griffiths & Co., Ltd.*	7 3	7 2½	7 5½	9 7

‡ Including new foundation.

LONG GROVE.—Works at Long Grove, for the London County Council:—

Airing Court Fencing.

D. Rowell & Co.	£1,298 6 8	Bayliss, Jones, & Bayliss	£1,095 19 8
A. J. Main & Co.	1,199 5 0	Hill & Smith, Brierley-hill*	1,071 10 0
G. Wright, Ltd.	1,117 3 8		

Turret Clock.

	Term of guarantee.	Seconds variation per week.	Amount.
J. W. Benson	50 years	7	£135 0
Potts & Sons	2 ,,	5	109 10
Smith & Sons	3 ,,	3	86 10
Gillett & Johnston, Croydon*	2 ,,	3	72 10

Laundry Machinery.

Moorwood, Sons, & Co., Ltd.	£7,381 10 0
Cherry Tree Machine Co., Ltd.	4,969 12 0
T. Bradford & Co., London*	4,664 11 2
W. Summerscales & Sons, Ltd.	4,633 0 0
D. & J. Tullis, Ltd.	4,244 0 0

Telephones, Fire-alarms, and Tell-tale Clocks.

Strode & Co.	£2,399	Cox-Walkers, Darlington*	£1,715
F. A. Glover & Co., Ltd.	2,067	Private Wire & Telephone Installation Company	1,495
Bromley, Batstone, & Kirk	1,760		

Kitchen Plant.

J. & F. May	£2,716 0
Killick & Cochran	2,684 0
Benham & Sons, Ltd.	2,548 0
G. N. Haden & Son, Ltd.	2,076 0
W. Summerscales & Sons, Ltd.	1,996 0
T. Bradford & Co., London*	1,938 0
Moorwood, Sons, & Co., Ltd.	1,578 0
McDowall Steven & Co., Ltd.	1,487 12

LONGTON.—For erecting a new rectory for the parish of St. James. Messrs. R. Scrivener & Sons, architect, Hanley:—

Colley & Lindop	£1,805	T. Goodwin	£1,730
G. Ellis	1,802	C. Cornes & Sons	1,700
J. Bagnall	1,795	Tompkinson & Betterilley, Longton*	1,687
P. H. Bennion	1,767		
T. R. Yoxall	1,760		

LONDON.—For roadworks, Sunnydene-street, Sydenham, and Grierson-road, Honor Oak, for Lewisham Borough Council:—

Grierson-road (Roadway).

B. Martin, Brockley	£580

Sunnydene-street (Roadway).

B. Martin, Brockley	553

Grierson-road (Footways).

Queenborough Cement Co., Ltd., Lloyd's-avenue, E.C.	151

Sunnydene-street (Footways).

Queenborough Cement Co., Ltd., Lloyd's-avenue, E.C.	175

LONDON.—For the re-instatement of premises, Central-street, Finsbury, E., for the London County Council:—

W. Gregar & Son	£3,112 0	L. H. & R. Roberts	£2,766 0
W. Shurmur & Sons, Ltd.	2,997 0	L. Whitehead & Co., Ltd.	2,724 0
Perry & Co.	2,953 0	E. Lawrence & Son	2,703 0
G. S. Williams & Son	2,930 0	W. M. Dabbs & Son	2,699 0
W. H. Lascelles & Co., Ltd.	2,913 8	Patman & Fotheringham, Ltd., Park-street, Islington*	2,637 0
E. Triggs	2,854 3		
J. Grover & Son	2,846 0		

[The Architect's (Education) estimate, comparable with these tenders, is £2,751.]

LONDON.—For the supply and erection of wrought-iron boundary fencing at Bethnal Green-gardens, for the London County Council:—

A. W. Elwood	£562 10 11	M. McVey, 363A, Kennington-road, S.E.*	£404 9 6
Hill & Smith	417 19 4	W. Gratrix & Sons‡	142 8 0
L. Faulkner & Son	406 6 0		

‡ For portion of work only.

LONDON.—For the reconstruction of Victory Bridge, carrying Ben Jonson-road over the Regent's Canal, Stepney, for the London County Council:—

Heenan & Froude, Ltd.	£6,161 1 3	Wilkinson Bros.	£5,600 0 0
J. Cochrane & Sons	5,807 19 2	A. Fasey & Son	5,566 8 3
G. Hay & Co.	5,806 11 10	J. Strachan	5,480 0 0
Muirhead & Co.	5,605 6 5	A. Thorne, London*	5,442 2 6

[The chief engineer's estimate comparable with the above tenders is £5,591 6s. 9d. A. Thorne to sub-let the manufacture of the steelwork to one of the under-mentioned firms, or to such other person or firm as may be approved by the chief engineer under the contract—J. Tildesley, Ltd., J. Westwood & Co., Horseley Company, Ltd., Thames Ironworks, Ltd.]

MORLEY.—For the erection of Tentering House, closets, and alterations of boiler house, boiler setting, etc., at Albert Mills, for the Albert Mills Co., Ltd. Messrs. T. A. Buttery & S. B. Birds, architects, Queen-street, Morley:—

Masons: H. Spensley, Morley*	£413 12 7
Joiners: J. W. Binks & Sons, Morley*	85 0 0
Plumber: G. A. Firth, Morley*	53 15 0
Slater: G. Rogerson, Morley*	25 10 0

NEWCASTLE-ON-TYNE.—For the erection of new county offices, for Northumberland County Council. Mr. J. A. Bean, County Surveyor, Moot Hall, Newcastle:—

W. Forster	£16,558 0 0	J. Parkinson & Sons, Ltd.	£14,833 12 1
J. Lant	16,395 0 0	J. & W. Simpson	14,825 0 0
J. C. Ferguson	16,209 0 0	J. C. Hope	14,763 5 1
W. T. Weir	16,000 0 0	T. Hunter	14,655 0 0
J. L. Miller	15,941 5 0	J. Craven	14,591 9 8
E. & A. Storey	15,801 0 0	North Durham Stone Co.	14,506 0 0
J. Jackson & Sons	15,500 0 0	A. Pringle	14,408 0 0
J. W. White	15,455 0 0	J. & W. Lowry	14,309 0 0
J. Howe & Co.	15,372 10 0	S. F. Davidson	14,300 0 0
Purdie & Thompson	15,343 10 4	Middlemiss Bros.	14,280 0 0
Kirk & Brown	15,335 15 6	T. Lumsden	14,250 0 0
J. Milne	15,306 9 0	G. H. Mauchlen	14,177 9 0
T. Weatheritt	15,300 0 0	Elliott Bros.*	14,082 19 6
E. Henderson & Son	15,206 0 0		

PERTH.—For erecting new church at Fens-road, for St. Mark's congregation. Mr. J. Walker Smart, architect, 28, York-place, Perth:—

Masons: Fraser & Morton, Perth*	£1,701
Joiners: Hay & Sims, Perth*	870
Plumbers, Gasfitters, and Ventilation: Frew & Sons, Ltd., Perth*	212
Plaster, Cement, and Tuck Work: J. Sharp, Perth*	203
Slater and Tile Work: A. Dryadale*	193
Glaziers: G. R. Douglas & Son, Perth*	100
Iron Railings: Macgregor, Perth*	95

ROTHWELL HAIGH.—For erecting an engineer's house at new workhouse, for Hunslet Guardians. Mr. J. H. Morton, architect, 50, King-street, South Shields:—

	Buildings.	Railings, etc.
H. G. Goldthorpe	£320 0 0	£35 0 0
J. Chapman & Sons	296 5 6	53 6 6
W. Simpkins	283 0 0	43 0 0
Binks Bros., Outwood, nr. Wakefield*	247 5 0	48 10 0

ST. COLUMB MINOR.—For sewerage works, for the St. Columb Major Rural District Council. Mr. R. Hansford Worth, engineer, 42, George-street, Plymouth. Quantities by engineer:—

J. Shaddock	£1,861 14 10	R. Hooper, St. Agnes, Cornwall*	£1,430 1 6
Napier & Sons	1,685 12 0	Hooper, Weaz, & Co.	1,412 7 0
T. Shaddock	1,626 13 2		
F. G. Collingwood	1,459 0 0		

SHANGHAI.—For a country residence in the Avenue Paul Brunat, Shanghai. Mr. W. M. Dowdall, architect, Shanghai:—

	Taels.		Taels.
Fu Ta Kee	49,232	Shanghai Building, etc., Co., Ltd.	39,241
Wong Yang Kee	46,200	Sung Da Kee	32,770
Hong Mow Kee	45,000	Zee Kuen Kee	32,000
Zeen Yung Chong	43,250		

[All of Shanghai, China. "Kee" is almost equivalent to "Co." The present value of the tael is 2s. 10d.]

SOUTH MOLTON (North Devon).—For erecting new classrooms, etc., at the Wesleyan Sunday Schools, for the trustees of the Wesleyan Church. Mr. Fred F. J. Sanders, architect and surveyor, 6, New-road, South Molton. Quantities by the architect:—

J. Holcombe	£613 0	W. Sanders & Son South Molton*	£512 15
W. Backwell	612 10		
H. J. Spiller & Son	595 0		

SOUTH MOLTON (North Devon).—For the erection and fitting of a brewery at the Barnstaple Inn, South Molton, for Mr. W. Vickery. Mr. Fred F. J. Sanders, architect and surveyor, 6, New-road, South Molton:—

For the Buildings.

W. Sanders & Son, South Molton* £246

For the Brewing Plant.

G. Adlam & Son, Bristol* 200

SOUTH MOLTON (North Devon).—For alterations, additions, and renovations at "Hawthornden," East-street, for Mr. R. L. Riccard. Mr. Fred F. J. Sanders architect and surveyor, 6, New-road, South Molton:—

Interior.

Bowden & Son, South Molton* £206 15 0

Exterior.

J. Comins, South Molton* 86 15 6

SURBITON.—For construction of a 9-in. sewer and reconstruction of house-drains at Oakhill-grove, for the Urban District Council. Mr. Henry T. Mather, Surveyor, Council Offices, Ewell-road, Surbiton. Quantities by Surveyor:—

S. Lane	£663 7 7	S. Atkins	£547 10 0
C. W. Killingback & Co.	653 0 0	S. Kavanagh & Co.	505 3 4
G. G. Raynor	630 0 0	G. Cheeswas	475 10 0
J. Chapman	564 0 0	G. Napier & Sons, Southampton*	453 13 9
H. E. H. Buckingham	557 0 0		

TAUNTON.—For erecting a new house, for Mr. C. Fear, in Greenway-road, Taunton. Mr. F. W. Roberts, architect and surveyor, 2, Hammet-street, Taunton:—

Weaver Bros.	£935 0 0	H. G. Smith	£759 12 0
Hart & Poole	834 17 6	F. Small, Taunton*	750 0 0
G. Handford	830 0 0		
Manning & Son	770 0 0		

SWAINBY.—For widening, etc., of Swainby Beck Bridge (stone), at Swainby Village, on the Northallerton and Stokesley main road, for the North Riding County Council, County Hall, Northallerton. Mr. W. G. Bryning, County Surveyor, Northallerton. Quantities by Surveyor:—

J. Kay	£310 0 0	R. P. Brotton	£185 0 0
T. Dickinson & Son	296 0 0	G. Dougill & Sons, Aysgarth, R.S.O.*	175 0 0
J. Pearson	208 16 2		
G. R. Wade	207 13 0		

TAUNTON.—For erecting a new classroom wing at Taunton School, Taunton, with a corridor to connect this extension with the new chapel (given by Lord Winterstoke; Mr. F. W. Wills, architect) in course of erection. Mr. F. W. Roberts, architect, 2, Hammet-street, Taunton. Quantities by the architect:—

—	Classroom Wing.	Corridor.	Total.
	£ s. d.	£ s. d.	£ s. d.
W. Cowlin & Son	—	370 0 0	—
Gleed Bros.	2,096 6 6	289 14 8	2,386 1 2
Chapman & Poole	2,089 12 3	277 8 8	2,367 0 11
F. Small	1,994 6 0	355 17 0	2,353 6 0
H. J. Spiller	1,948 0 0	351 0 0	2,299 0 0
W. Potter	1,941 5 0	315 0 0	2,256 5 0
Manning & Son	1,930 0 0	243 0 0	2,170 0 0
H. G. Smith	1,799 0 0	319 0 0	2,118 0 0
T. Moggridge	1,831 0 0	261 9 6	2,092 9 6
A. J. Spiller, Taunton*	1,830 0 0	239 10 0	2,069 10 0

TERRINGTON ST. CLEMENT (Norfolk).—For alterations to buildings at High House Farm, for Mr. William Wing. Messrs. Walker & Walker, architects and surveyors, Hill-street, Wisbech, and Terrington:—

H. W. Reeder	£264 10	G. J. West	£195 0
F. S. Flood	195 0	P. Bone	169 0
J. Linder	195 0	J. Holman*	139 10

TERRINGTON ST. CLEMENT (Norfolk).—For additions to house at Beacon-hill, for Mr. A. Andrews. Messrs. Walker & Walker, architects and surveyors, Wisbech and Terrington:—

Sleight & Morton	£154	F. S. Flood*	£108
H. W. Reeder	140		

TONBRIDGE.—For stoneware pipe sewer, 233 yds. in length, near the Green, Leigh, for the Sevenoaks Rural District Council. Mr. A. Fowler, Surveyor, Longford, Sevenoaks:—

G. Chesswas, Isleworth* £91 10

TOOTING.—For external painting works at Tooting Bec Asylum, S.W., for the Metropolitan Asylums Board. Mr. W. T. Hatch, Engineer-in-Chief. Quantities by Messrs. Fowler & Hugman, 9, Adam-street, Adelphi, W.C.:—

Sabey & Son, Ltd.	£2,363 0 0
J. J. Richards	2,255 6 5
Callow, Wright, & Hewlett, Ltd.	2,230 12 7
Heffer & Co.	1,777 0 0
R. Woollaston & Co.	1,750 0 0
H. Line	1,685 0 0
W. A. King	1,591 15 0
E. Swan & Son	1,454 0 0
H. Bragg & Sons, Ltd.	1,438 7 5
Woollaston Bros.	1,390 0 0
E. P. Holtham	1,341 17 8
W. H. Lorden & Son	1,297 0 0
A. Heritier & Co.	1,223 9 6
W. Johnson & Co., Ltd.	1,223 0 0
F. Kinnaird	1,209 17 9
A. H. Inns	1,105 0 0
C. A. Adams	1,104 15 0
W. J. Simms & Sons	1,081 0 0
S. T. Wright & Co.	1,061 1 4
F. Proctor & Son	1,040 0 0
M. McCarthy	984 0 0
W. Hussey	874 0 0
L. Kazak, 3 and 4, Station-road, Belvedere, Kent*	724 8 0
J. Arundel (Exors. of)	723 5 4
J. Walker & Son	597 16 7

WHISSONSETT (Norfolk).—For the erection of house on farm for Mr. J. English. Messrs. Walker & Walker, architects and surveyors, Wisbech and Terrington St. Clement:—

G. Brown	£305 0	Springall & Son	£284 0
C. Tuthill	287 11	J. W. Warne	255 0
W. D. Boddy	286 10		

WELLS-NEXT-SEA (Norfolk).—For the enlargement of school, for the Norfolk Education Committee. Mr. A. F. Scott, architect, Castle Meadow, Norwich:—

J. Needs, Builder, Fakenham* £1,032

[Ten tenders were received.]

WIMBLEDON.—For the erection of a gallery round engine-room at Electricity Works Extension, Durnsford-road, for the Corporation:—

Edwards & Co.	£198 6 0	Cross & Cross	£129 0 0
Wood & Co.	170 0 0	Norton Bros.	128 7 4
S. Wheeler	165 0 0	McGregor Bros.	127 10 0
Jones & Co.	161 18 6	Hitchen & Sons	125 10 0
Westwood & Wrights	154 0 0	Hayward Bros.	124 0 0
Little & Sons	150 0 0	Watkins, Jones, & Sons	118 0 0
Pierson & Co.	147 12 0	Jukes, Coulson, Stokes, & Co.	110 0 0
Greatorex & Son	145 7 0		
Russell & Son	130 0 0		

WINCHMORE HILL.—For hot-water heating apparatus for pavilion No. 1 at Northern (Convalescent) Fever Hospital, for the Metropolitan Asylums Board. Mr. W. T. Hatch, Engineer-in-Chief:—

R. Dawson & Co., Ltd.	£174 10 0	J. Yetton & Co.	£124 16 0
H. T. Wright Bros., Ltd.	173 0 0	Brightside Foundry & Engineering Co., Ltd.	123 0 0
Clark, Hunt, & Co., Ltd.	172 14 6	T. T. Smith & Co.	121 5 0
C. Kite & Co.	165 0 0	Lancashire Heating Co., Ltd.	120 0 0
Boulton & Paul, Ltd.	165 0 0	Stubbs, Son, & Hall	117 10 0
Z. D. Berry & Sons	165 0 0	Dargue, Griffiths, & Co., Ltd.	116 0 0
Death & Ellwood	162 8 0	J. & F. May	115 10 0
Hendry & Pattison, Ltd.	159 0 0	A. H. Marshall	115 10 0
Bolton, Fane, & Co.	150 0 0	G. N. Haden & Sons	115 0 0
Cannon & Hefford	149 0 0	J. Boyd & Sons	109 0 0
M. Duffield & Sons, Ltd.	147 8 0	Moorwood, Sons, & Co., Ltd.	107 0 0
J. Gray	143 0 0	South-Eastern Engineering Co.	99 10 0
J. Russell & Sons	140 10 0	W. G. Cannon & Sons, Ltd.	95 0 0
T. Potter & Sons, Ltd.	137 0 0	W. Freer	89 0 0
J. Crispin & Sons	136 0 0	Matthews & Yates, Ltd., Cyclone Works, Swinton, Manchester*	83 0 0
Watford Engineering Works	130 0 0		
Korting Bros., Ltd.	126 0 0		
G. & E. Bradley	125 0 0		

WITLEY (Surrey).—For country cottage for Mr. R. C. Garton. Mr. J. H. Howard, architect, Haslemere:—

Haslemere Builders	£1,210 0	R. Smith	£1,150 0
Chapman & Lowry	1,200 0	D. Fry	1,133 0
Entticknap & Sons	1,175 19	Cæsar & Son, Liphook*	1,055 10

J. J. ETRIDGE, Jr.

SLATE MERCHANT,

SLATER & TILER.

Penrhyn-Bangor,
Oakeley-Portmadoc,

and every other description of Slates, except American, ready for immediate delivery to any railway station.

Red Sandfaced Nibbed Roofing Tiles always in Stock.

Applications for Prices, etc., to

BETHNAL GREEN SLATE WORKS,
Bethnal Green, London, E.

The BATH STONE FIRMS, Ltd., BATH,
the Proved Kinds of

BATH STONE.

FLUATE, for Hardening, Waterproofing, and Preserving Building Materials.

HAM HILL STONE.
DOULTING STONE.

The Ham Hill and Doulting Stone Co., Limited
(Incorporating the Ham Hill Stone Co. and C. Trask & Son, The Doulting Stone Co.).
Chief Office:—Norton, Stoke-under-Ham, Somerset.
London Agent:—Mr. E. A. Williams, 16, Craven street, Strand.

Asphalte.—The Seyssel and Metallic Lava Asphalte Company (Mr. H. Glenn), Office, 42, Poultry, E.C.—The best and cheapest materials for damp courses, railway arches, warehouse floors, flat roofs, stables, cow-sheds and milk-rooms, granaries, tun-rooms, and terraces. Asphalte Contractors to the Forth Bridge Co.

SPRAGUE & CO., Ltd.,
LITHOGRAPHERS,
Employ a large and efficient Staff especially for Bills of Quantities, &c.
4 & 5, East Harding-st., Fetter-lane, E.C.

QUANTITIES, etc., LITHOGRAPHED accurately and with despatch. [Telephone No. 434 Westminster.
METCHIM & SON {8, PRINCES STREET, S.W., and 31, CLEMENT'S LANE, E.C.
"QUANTITY SURVEYORS' DIARY & TABLES," For 1906, price 6d., post 7d. In leather, 1/-, post 1/1.

GRICE & CO., STONE MERCHANTS,
ADDISON WHARF, 191, Warwick Rd., KENSINGTON,
FOR ALL THE BEST
Building & Monumental Stone
A LARGE STOCK OF BEST
CAEN Stone { For HOME TRADE and EXPORT,
in Block, Slab, and Scantling.

ASPHALTE
For Horizontal & Vertical Damp Courses.
For Flat Roofs, Basements, & other Floors.

Special attention is given to the above by
THE
French Asphalte Co.
CONTRACTORS TO
H.M. Office of Works, The School Board for London, &c
For estimates, quotations, and all information apply at the Offices of the Company.
5, LAURENCE POUNTNEY HILL,
CANNON STREET, E.C.

Twelve Gold & Silver Medals Awarded.

IRON CISTERNS.

F. BRABY & CO., LTD.

Very Prompt Supply. Large Stock Ready. Cylinders for Hot-Water Circulation.

PARTICULARS ON APPLICATION.

LONDON: 352 to 364, EUSTON RD., N.W., and 218 and 220, HIGH ST., BOROUGH, S.E.
LIVERPOOL: Havelock Works, Litherland.
GLASGOW: 47 & 49, St. Enoch Square.
BRISTOL: Ashton Gate Works, Coronation Road.